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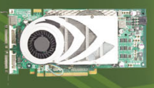

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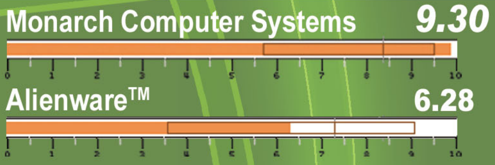

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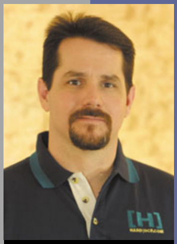

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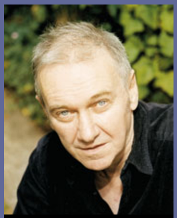

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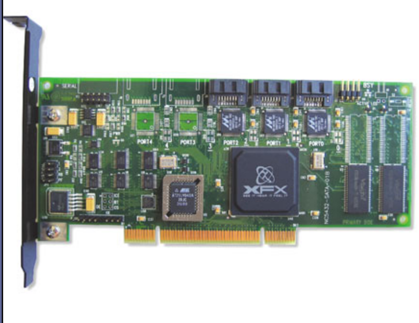

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GREETINGS FROM SAMITLAND

Egad, I can't believe we're in September already. I could swear it was only 2005 PD (Pre Dual-Core) when I was last grumbling about how fast the time had been flying by. Since then, we've (obviously) had numerous dual-core CPUs from AMD and Intel, including the Athlon64 X2 4800+ and Pentium D Extreme Edition. However, this month we look at some single-core processors (pages 21 and 22). We also put the NVIDIA GeForce 7800 GTX through the paces (reviewed on page 20), while we wait to see what ATI will have to show when it releases the much-delayed R520. (Speaking of which, we're also looking forward to some hands-on testing with ATI's CrossFire technology.) Another cool piece of hardware is the driverless XFX Revo64 SATA Controller (page 25)—I had an opportunity to get an in-depth preview of the underlying Netcell NC3000 processor earlier this year. It's promising.

This month's "X-ray Vision" (page 38) will be of interest to any of you who work in a cube. Ever notice how much more you can get done after 5 p.m. when all the Chatty Cathys are gone for the day? Just think how much you could get done during the day if you were actually able to concentrate and execute your plans for world domination (Muuuuu-ha-ha-ha). Next, flip over to page 40 for our "White Paper" on focused audio. This is a technology that I've been watching closely, and it will revolutionize the way we listen to audio.

We saw how much you loved our July 2005 issue ("Build Your Ultimate PC") and, as requested, wanted to make sure we covered the topic completely for those of you on-the-go. In this month's Spotlight we're going to walk you through building your own notebook (page 54). After all, why make do with an OEM notebook when you can customize it to your own specs? (Have no fear; we've included some prebuilts on page 64 for those of you not as inclined to build your own.) And then for the truly tech-savvy, we've included some of the coolest on-the-go gear available today ("Gear Gone Mobile" on page 66).

Well, that's it for now. And it looks like Wife Choudhuri is on the horn. Time for my "Yes, dears" and to bid you a hearty au revoir. As always, please let us know how we're doing. We've got some great stuff lined up for next month, so see you then. Cheers.

Samit G. Choudhuri, Publication Editor, *CPU*

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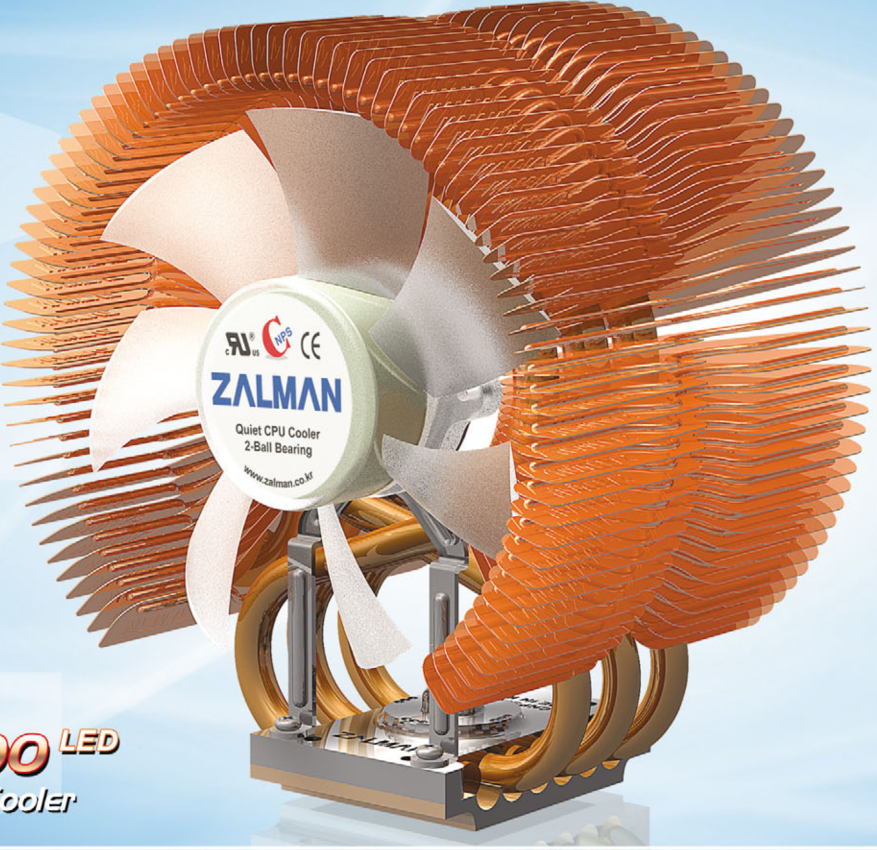

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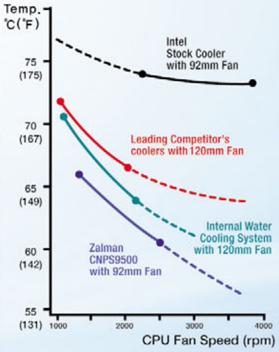

- CPU : Intel Pentium 4 550 (TDP 115W)
- Ambient Temperature : 30℃

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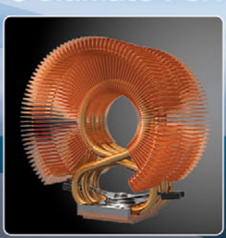

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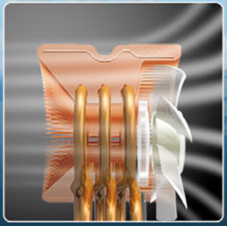

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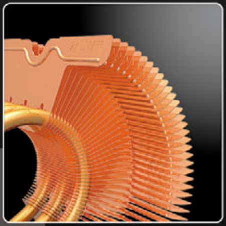

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Compiled by
Steve Smith

Microsoft Blows Up Your Remote

For many home theater prosumers who need the biggest remote on the block, Microsoft now obliges with the Remote Keyboard for Windows XP Media Center Edition. The backlit keys are designed for typing in darkened living rooms, and the built-in mouse and remote control navigate menus and control all TV and multimedia functions. Just try losing this one between the couch cushions. ▲

Half-Life 2 Cost You How Much?

Best PC game of all time? Maybe. But were the rights to bundle Half-Life 2 game vouchers with new Radeon cards last year worth $8 million? An investigative report by The Inquirer.com (Full disclosure: Mike Magee is a regular columnist for *CPU*. See his column on page 97.) says ATI's copromotion deal involved paying developer Valve $2.4 million cash up front, another $4.4 million for the game bundles, and $1.2 million for comarketing. Valve unwittingly repaid the favor by missing the HL2 release date and handing ATI an unexpected extra year of time to market the 9600 XT and 9800 XT cards with coupons for a free HL2. An ATI spokesperson will neither confirm nor deny this specific report but characterizes many press rumors about ATI as "pure fiction." ▲

Game celebrity Gordon Freeman isn't even real, but his and Half-Life 2's endorsement and bundling deal with ATI may have been worth up to $8 million.

Now Your Data Even Looks Secure

Sometimes appearances matter; for example, the Imation USB 2.0 Micro Drive's unique padlock shape had some sort of deterrent effect on us. The loop portion is actually a flexible USB cable that unlocks, connects to your PC, and adds 2GB or 4GB of portable storage. Also, actual data security is involved here,: Magnetic Data Encoding, 128-bit encryption, password protection, and an autosyc feature that automatically backs up and syncs the files to multiple locations. The 1.6-inch x 3.3-inch minidrive should be available as you read this for $159 (2GB) and $189 (4GB). The Imation drive is also rated to withstand 1,000Gs of force—perfect for doing data transfers while banging your laptop against a wall or launching into suborbit. ▲

Imation wraps a lockbox around 2GB and 4GB drives, which are about the size of a quarter.

X-Fi Hypes The Volume To 11

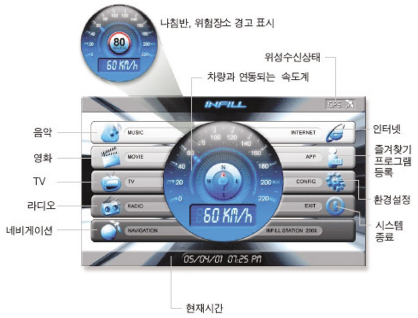
As sophisticated motherboard-based audio solutions threaten standalone cards, Creative strikes back with big claims about its upcoming X-Fi (Xtreme Fidelity) sound processor. The X-Fi promises a true audio accelerator with 10 billion instructions per second, offloading game, MP3, and movie sound tasks from a CPU to boost overall system performance. Creative claims a 17% frame rate increase in Unreal Tournament 2004 over onboard HD audio processors. X-Fi is supposed to enhance MP3 and low-res soundtracks with a 24-bit Crystalizer and Super-Ripping, which turns CD tracks into 24-bit, multichannel 3D audio files. Those are a lot of promises to keep, but according to the countdown at SoundBlaster.com, we should know if Creative made good on its claims by the time you read this. ▲

Creative is promising that the new X-Fi audio processor will both accelerate and substantially enhance virtually all PC-based sound.

Hardware Mole

DWC: Driving While Computing?

And we thought cell phones and SUVs were a dangerous combo. Just wait until those car-pooling soccer moms start playing Bejeweled on the Infill T3 PC for cars. Tucked inside this dashboard rack is a 1GHz or 1.6GHz Pentium CPU (according to different translations of the Web site), Windows XP, 40GB storage, DVD drive, GPS, TV Tuner, voice control, and (naturally) a remote. There will even be an open PCI slot. Commuters can use a combination of touchscreen and multimedia shortcut buttons to control the T3 without the radical distraction of a keyboard. Nevertheless, we can see the irate backlash of bumper stickers now: "Get off your PC and drive!" ▲



What no cup holder? Infill's T3 packs just about everything else into this PC for your dashboard.

Monopoly Is A Tough Rap To Prove

AMD says in an antitrust lawsuit that rival Intel engaged in "worldwide coercion of customers from dealing with AMD." The problem is that AMD will have to subpoena its own valued partners and PC manufacturers to prove that Intel used money and intimidation to maintain a monopoly. Industry experts say that this will put OEMs in a sticky situation because they will have to give up evidence against their chief tech partner. ▲

Camcorder To Go, No Onions

In a novel marketing experiment, the Samsung Experience shop in midtown Manhattan is lending visitors the latest model digital cameras or camcorders for up to three hours. The Tech Take Out program encourages consumers to test out Samsung products by taking them out on the street to capture footage and images. A photo ID and credit card are required to secure the loan, of course, but upon the unit's return, Samsung will show you how to burn your footage onto a DVD, put it on a CD, or print three photos as souvenirs. ▲

Compiled by Dean Takahashi

XDR2 From Rambus Offers Big Boost In Memory Bandwidth

The PlayStation 3 will have rockin' XDR memory chips that transfer data at a rate of 3.2GHz; however, the new memory interface from Rambus, dubbed XDR2, will transfer data at 8GHz. Richard Warmke, director of Rambus product marketing, says games with intense 3D graphics should benefit from the faster speed. But will this enable memory to close the gap with processor speeds? It will help, Warmke says, but not enough to satisfy power users. Consequently, Rambus will license the technology to memory chipmakers that are expected to debut XDR2 DRAM chips in 2007. The XDR2 interface includes several innovations that enable data to overcome noise problems in computer pathways. XDR2 also includes an innovation known as microthreading, which can quadruple memory speed through architectural improvements alone. With microthreading a processor will fetch data in chunks of eight bytes at a time, instead of the typical 32 bytes, which is more efficient. ▲

Cell Seeks Markets Beyond PlayStation 3

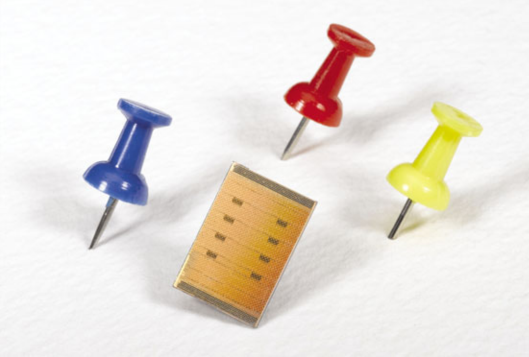
The strategy behind the Cell computer chip is to infiltrate everything from handheld computers to supercomputers. As such, it represents a big challenge to the hegemony of Intel and other microprocessor vendors. This strategy seems to be a hollow claim because the Cell chip was designed for the PlayStation 3 and will be the first to use the chip. However, IBM announced that Mercury Computer Systems (www.mc.com) will use Cell chips in markets that go beyond gaming. Mercury will use the chips in machines for medical imaging, defense radars, and seismic processing. Raj Desai, vice president at IBM, says the Cell strategy is bearing fruit. He says that Cell chips, which can process up to 200 billion Flops, will be useful in any application that requires a lot of data processing, image construction, or image display. Toshiba has promised it will use Cell chips in digital TV sets, and Sony Electronics executives say they will use Cell chips in their own video products. ▲

Watching The Chips Fall

Here is pricing information for AMD and Intel CPUs.

*Retail price
** Manufacturer's price per 1,000 units
Other current prices, if indicated, are lowest OEM prices available through Pricegrabber.com

CPU	Released	Original price	Current price	Last month's price
AMD Athlon 64 3200+	9/23/2003	$417**	$167	$178
AMD Athlon 64 3400+	1/6/2004	$417**	$172	$169
AMD Athlon 64 3500+	6/1/2004	$500**	$249	$243
AMD Athlon 64 3700+	6/1/2004	$710**	$319	$327
AMD Athlon 64 3800+	6/1/2004	$720**	$358	$359
AMD Athlon 64 4000+	10/19/2004	$729**	$482	$482
AMD Athlon 64 FX-55	10/19/2004	$827**	$799	$809*
AMD Athlon 64 FX-57	6/27/2005	$1031**	$1,101	N/A
AMD Athlon 64 X2 Dual-Core 4200+	5/31/2005	$537**	$526	$537**
AMD Athlon 64 X2 Dual-Core 4400+	5/31/2005	$581**	$617	$581**
AMD Athlon 64 X2 Dual-Core 4600+	5/31/2005	$803**	$803**	$803**
AMD Athlon 64 X2 Dual-Core 4800+	5/31/2005	$1001**	$1,042	$1001**
Intel Pentium 4 3.4GHz 800MHz FSB	2/2/2004	$417**	$283*	$271
Intel Pentium 4 Extreme Edition 3.73GHz 2MB cache 800MHz FSB	2/21/2005	$999**	$1010*	$1016*
Intel Pentium Processor Extreme Edition 840 3.2GHz dual-core	4/18/2005	$999**	$1014*	$999**
Intel Pentium 4 530 3GHz 1MB cache 800MHz FSB 90nm	6/27/2004	$218**	$171*	$165*
Intel Pentium 4 540 3.2GHz 1MB cache 800MHz FSB 90nm	6/27/2004	$278**	$189*	$189*
Intel Pentium 4 550 3.4GHz 1MB cache 800MHz FSB 90nm	6/27/2004	$417**	$289*	$289*
Intel Pentium 4 560 3.6GHz 1MB cache 800MHz FSB 90nm	6/27/2004	$637**	$402*	$394*
Intel Pentium 4 570 3.8GHz 1MB cache 800MHz FSB 90nm	11/15/2004	$637**	$659*	$659*
Intel Pentium 4 630 3GHz 2MB cache 800MHz FSB 90nm	2/21/2005	$224**	$222*	$202*
Intel Pentium 4 640 3.2GHz 2MB cache 800MHz FSB 90nm	2/21/2005	$273**	$266*	$276*
Intel Pentium 4 650 3.4GHz 2MB cache 800MHz FSB 90nm	2/21/2005	$401**	$402*	$370*
Intel Pentium 4 660 3.6GHz 2MB cache 800MHz FSB 90nm	2/21/2005	$605**	$609*	$610*
Intel Pentium 4 670 3.8GHz 2MB cache 800MHz FSB 90nm	5/26/2005	$849**	$849**	N/A
Intel Pentium D 2.8GHz dual-core 2MB cache 800MHz FSB 90nm	5/26/2005	$241**	$241**	N/A
Intel Pentium D 3GHz dual-core 2MB cache 800MHz FSB 90nm	5/26/2005	$316**	$316**	N/A
Intel Pentium D 3.2GHz dual-core 2MB cache 800MHz FSB 90nm	5/26/2005	$530**	$530**	N/A



IBM Plunges Into Image Sensor Market

IBM is having a Kodak moment. The company announced that it will use a breakthrough image sensor technology to break into the market for image sensors in digital cameras and camera phones. The company will integrate IBM's own copper interconnection technology with Kodak's proprietary image sensor technology. CMOS image sensors are growing at a rate of 40% per year, according to market researcher iSuppli. So, IBM and Kodak have collaborated on a manufacturing process that optimizes the collection of light, reduces power leakage, and lengthens battery life. This manufacturing process will deliver better quantum efficiency, or a measure of how much light the sensor can capture. The result will be better picture quality in low light settings, picture contrast, and dynamic range (the combination of dark and bright sections in a single image). IBM says the switch will help accelerate the shift from CCDs to CMOS image sensors. ▲

What's Happening • Internet

Compiled by Ryan Syrek

Say It Proud, Say It Loud

If you can somehow manage to boil a lifetime of frustration, excitement, confusion, and sarcasm down to one 60-second tirade, you finally have an outlet: One Free Minute (www.onefreeminute.net), a traveling mobile sculpture, consists of a loudspeaker that kicks out one-minute jams phoned in by participants around the world. You can either leave your message on an answering machine to be played randomly during a performance or send an email request to receive the live hotline number. The site features video of performances and an audio sample of some of the entries. Best of all, the authors of the rants will remain anonymous, giving you the freedom to mock co-workers or politicians without fear of reprisal. It's the First Amendment in action, one minute at a time. ▲

If you see this bike and speaker, you're about to hear free speech in action.

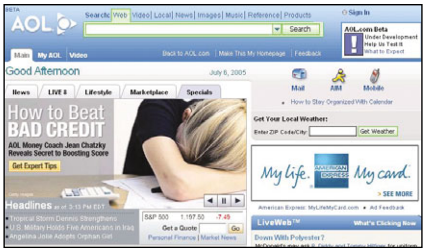
Bloggers Beware

As it turns out, you actually can't just say whatever you want to in blogland and get away with it. Given the increasing attention to online journalists (some of it is even positive), questions surrounding the legal parameters of blogging are springing up as fast as, well, bloggers are. Thankfully, the EFF (Electronic Frontier Foundation) has put together a helpful Legal Guide (www.eff.org/bloggers/lg/) to answer many FAQs. While the EFF stresses this is not official legal advice, it does contain suggestions regarding privacy, intellectual property, reporter's privilege, and defamation along with several other legal sticky wickets. It's an informative way to remind bloggers to think before posting. ▲

The EFF (Electronic Frontier Foundation) reminds us to blog safe and blog legal.

AOL's Got A Brand New (Beta) Bag

Take a quick jaunt over to AOL.com's site, click the Preview AOL.com Beta button, and you'll see the Botox-free facelift that AOL.com is about to receive. Chock-full of new features (free AIM mail, a Google-enhanced search, shopping resources, and digital picture storage), most of the portal will be open to non-AOL subscribers. Perhaps most exciting are the links to original programming (such as the LIVE8 performances and other various music sessions) and the Video Hub, which will feature a large, searchable collection of videos. Throw in AOL Journals, a blogging tool, and a customizable layout and you have an AOL that's functional and pretty to look at. Though still fighting bugs, it looks to have brains and beauty, a legendary package long thought to be an oxymoron. ▲



- Tropical Storm Dennis Strengthens
- U.S. Military Holds Five Americans in Iraq
- Angelina Jolie Adopts Orphan Girl

AOL.com is getting quite the facelift, complete with new video, mail, and search features.

thinkfree Office Online BETA

ThinkFree's Office Online is a free way to avoid compatibility issues between Microsoft Office documents and computers that don't sport the suite.

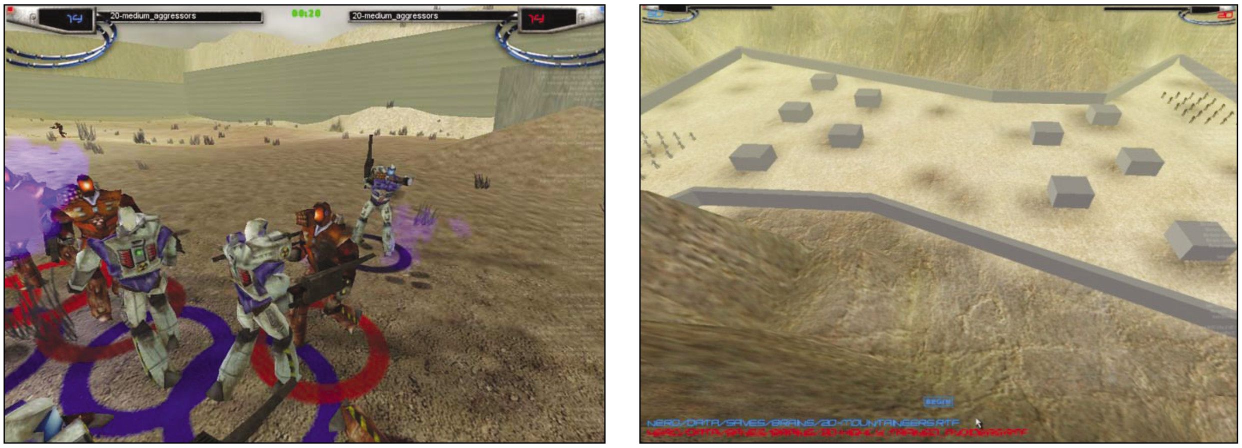
It's Office Without The Office

After a long, hard day at the office, there's nothing more enjoyable than trying to alligator-wrestle a Microsoft Office document into readability on your Office-free home computer. You could, of course, plop down the hundreds needed to acquire the suite, or you could simply use ThinkFree Office Online Beta (www.thinkfree.com). ThinkFree offers word processing, spreadsheet, and presentation graphics appliances that are compatible with Microsoft Word, Excel, and PowerPoint; the files can be saved in .DOC, .XLS, and .PPT format. As if that weren't enough, ThinkFree tosses in Blog Embedding (which lets users embed a miniversion of the software into a blog, so that visitors can read, edit, and manipulate Microsoft Office files) and PDF capabilities. ThinkFree Online will work with various browsers (Internet Explorer 6.0 or higher, Firefox 1.0.1 or higher, and Safari 1.3) and Windows 98/2000/XP, Mac OS X 10.3/10.4, Linux Fedora Core 3, Redhat Linux 9, or Haansoft Linux Workstation 2005. It certainly beats the "You vs. Microsoft Office Files" feud. ▲

Compiled by Steve Smith

Want To Play Neuro-Evolutionary War?

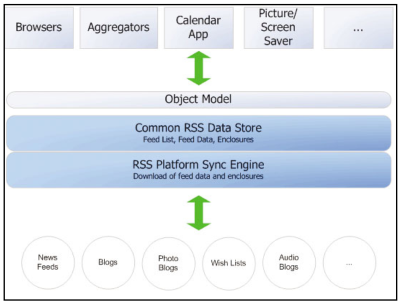
Now your inner geek can play real-time strategy games while exploring cutting-edge AI theory. Project NERO at the University of Texas Austin (nn.cs.utexas.edu/NERO/index.php) has a downloadable RTS game based on neural nets and machine learning techniques dubbed neuroevolution. You train AI game robot teams by exposing them to increasingly challenging battle scenarios and obstacles and then reward the groups that perform well and punish those that don't. Thus, your bots learn battlefield doctrine, and the "fittest" survive to take on an opponent's similarly trained bots. This is a long way from Rock'Em Sock'Em Robots. ▲



Robots grow a brain in Project Nero, where human players engage their soldiers' sophisticated robot AI to learn thinking through new situations.

Longhorn Spears RSS

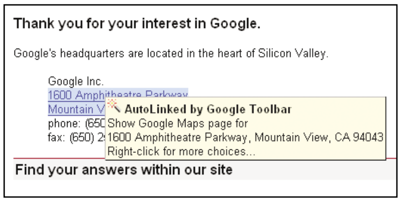
Longhorn will incorporate RSS at the OS level so that both Web browsers and applications can use these popular feeds in new and easy ways, according to Microsoft. The next version of Internet Explorer will be able to recognize when an RSS 2.0 or Atom feed is present on a page and offer users one-click subscriptions. Windows will maintain a common list of subscriptions and a storage area for RSS downloads. The feeds could interact with application APIs and trigger automatic program updates or changes in shared calendars. Microsoft will also add Simple List Extensions to the RSS protocol so publishers and users can control the order of items in a feed and create ranked lists where items change positions dynamically. ▲



Applications under Longhorn will hook into a common pool of RSS subscriptions and feeds to dynamically update all kinds of data.

Firefox Gets Its Google On

The long awaited official Google Toolbar (toolbar.google.com/firefox/) for Firefox is now available. It mimics the IE version, with AutoFill, a term highlighter, and a drop-down search bar with history. New to both toolbars is the very cool AutoLink, which hot links street addresses on Web pages directly to the Google map of the location. Cooler still is the WordTranslator, which translates any word on a Web page that you mouse over from English to one of seven languages. We found one word that does not register with this tool, however. Apparently, "Google" needs no translation. ▲



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1600 Amphitheatre Parkway
Mountain V
phone: (650
fax: (650) 2

AutoLinked by Google Toolbar
Show Google Maps page for
1600 Amphitheatre Parkway, Mountain View, CA 94043
Right-click for more choices...

Find your answers within our site

The new Google Toolbar links any address on a Web page to a map of its exact location.

Software Shorts

iTunes 4.9 Downloads Podcasting To The Masses

A fad has now become a craze. The release of iTunes 4.9 with podcast support has supercharged the downloadable spoken audio format. Within two days of launching the new software, Apple says there were over 1 million subscriptions to podcasts from its iTunes Podcast Directory. Podcasting pioneer Adam Curry witnessed subscriptions across his own PodShow Podcast Network skyrocket immediately as Apple appeared poised to legitimate and accelerate on-demand radio just as it ignited the digital music download industry with the original iTunes. "I predict over the coming months that iTunes will introduce tens of millions of new listeners to the world of podcasting," says Curry. ▲

With its customary usability and style, Apple is turning the nascent hobby of podcasting into a highly polished media distribution system.

WordPerfect Wants To Change Your Outlook

Corel's WordPerfect brand takes a stab at Microsoft Outlook with its new email alternative. Based on State Lab's Bloomba client, WordPerfect Mail leads with speed, claiming email, calendar, and contact searches that are "dozens of times faster" than the leading brand. You can also consult the calendar without leaving the mail window. And RSS feeds are integrated into the program as is SA Proxy Pro antispam protection. Value priced at $69, WordPerfect Mail is also included in the new WordPerfect 12 office suite for small businesses. ▲

What Is Spyware, Anyway?

While we're still trying to figure out what it means, let alone how it resolves disputes over what is and isn't "spyware," the Anti-Spyware Coalition (www.antispywarecoalition.org) has issued a first draft of a formal definition of the hotly debated term. Take a deep breath. Spyware is "technolog[y] implemented in ways that impair[s] users' control over: material changes that affect their user experience, privacy, or system security; use of their system resources, including what programs are installed on their computers; collection, use, and distribution of their personal or otherwise sensitive information." Whew! And the difference between this and most *adware* is . . . ? ▲

Open-Source Nation

The Norwegian Minister of Modernization (where can we get a title like that?) wants all government institutions to use only open-source software. All public sector offices must have a plan in place by next year for doing business without proprietary solutions. This is all part of a massive eNorge 2009 tech plan for Norway to connect all of its people digitally with their government, including providing every citizen with a personal home page and a personal electronic ID. ▲

Compiled by Kevin Savetz

BIOS Upgrades Available Online

Before you send another motherboard to the landfill, consider upgrading the BIOS and giving your PC a new outlook on life. Here are a few recently released upgrades. Readers can check out www.cpumag.com/cpusep05/bios to see our entire upgrade list.

Motherboard	Date Available	URL
ABIT AV8-3rd Eye	06/16/2005	www.abit-usa.com/downloads/bios/bios_revision.php?categories=1&model=201
ABIT Fatal1ty AN8	06/16/2005	www.abit-usa.com/downloads/bios/bios_revision.php?categories=1&model=262
AOpen vK8T800a-LF	07/06/2005	download.aopen.com.tw/userdownload_List.aspx?RecNo=9902&Model=i865PEa-7IF
ASUS P5P800	04/08/2005	support.asus.com/download/download.aspx?SLanguage=en-us
ECS 945G-M3	07/05/2005	www.ecsusa.com/downloads/downloads_main.cfm?to=Motherboard
EPoX EP-8HEAI	06/30/2005	www.epox.nl/downloads/bios/?obj_product_id=287

Compiled by Steve Smith

RAW DATA

8%

Percentage of Cold Play's "X&Y" albums sold as digital downloads

MP3newswire.net

23.30%

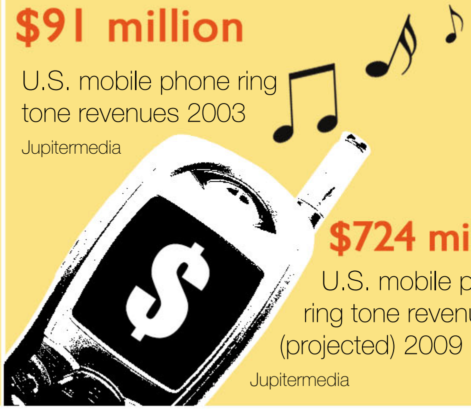
Percentage of worldwide spam originating from South Korea

Jupiterweb

$91 million

U.S. mobile phone ring tone revenues 2003

Jupitermedia



$724 million

U.S. mobile phone ring tone revenue (projected) 2009

Jupitermedia

41.5 million

Number of text message votes on American Idol contestants in 2005

MobileTracker

American Idol

The Job Search

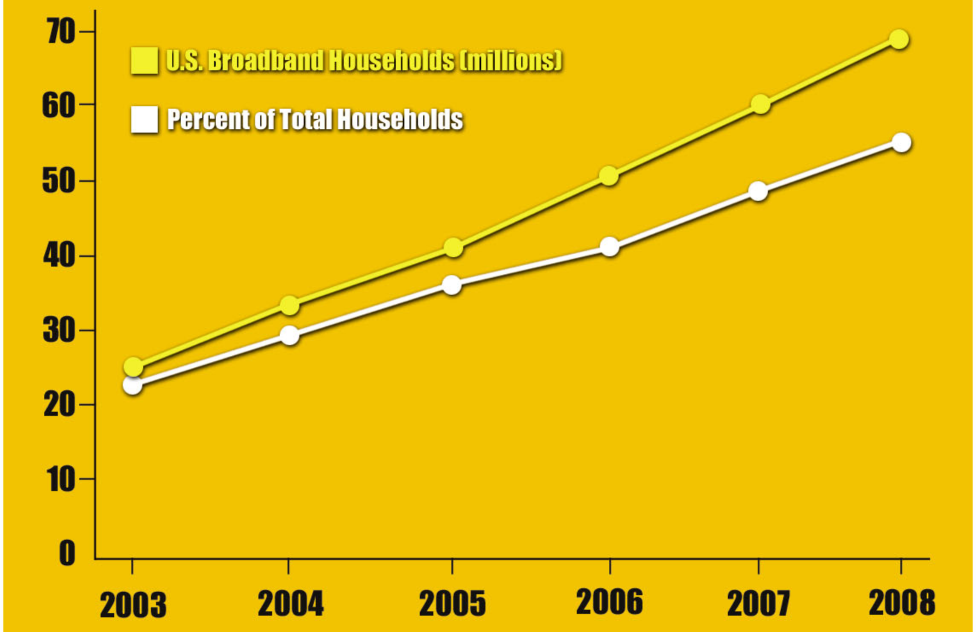
Ten-hut! It's time for game programmers to sign up for duty. Software Consultants & Recruiters is looking to fill a spot for an Orlando-based military simulation firm. Uncle Sam needs software engineers experienced in MMOG design. If you know the Unreal, Torque, or Source game engines, then you might be qualified to design complex real-time military sims, model aircraft, digital communications, and other semiautomated player characters in the virtual environment. It's an $80,000 per year gig in the heart of Disney country—a plumb for lovers of Mickey and military sims.

Love The Technology, Hate The Help

IT departments take note; your colleagues throughout the organization still don't like you very much, according to the latest Forrester Research on satisfaction with technology in the workplace. Enterprise workers really appreciate the technology itself, saying they were very happy with PC reliability and software usability, especially the advantages of calendaring and email. But when something goes wrong, many dread calling the company IT help desk, which ranks lowest in user satisfaction on the IT spectrum. In fact, the more business users rely on the help desk, the more they come to dislike its inability to solve problems quickly. And yup, the old stereotypes keep hanging on; most users aren't happy with the way their tech departments implement and communicate technology changes. Of course, no one likes change, but is that any reason to beat up the poor IT guy? Well, if he's one of those hopeless tech dweebs who insist on wearing an "I Hate Jar Jar Binks!" T-shirt to work, then feel free to swing away.

U.S. Broadband Household Penetration (2003 To 2008)

According to eMarketer projections, broadband Internet access will reach the majority of U.S. households by 2008.



Sources: eMarketer

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The sleek, free-flowing lines of Sanus Platinum furniture reflect the beauty of today's digital televisions. And the newest addition, model PFFP flat panel TV stand, opens up possibilities to mount a flat panel television anywhere. An extruded aluminum column extends rigid strength from the steel-framed base to handle flat panel TVs up to 50". The Virtual Axis™ tilting system provides smooth motion with the touch of a fingertip. And features like a hidden cable channel, an adjustable glass shelf and a custom blended silver finish provide the perfect finishing touches to this innovative flat panel TV stand. So if your home theater is short on wall space, your options are now wide open.

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by Alex St. John

Stop Me If You've Heard This One Before

Alex St. John was one of the founding creators of Microsoft's DirectX technology. He is the subject of the book "Renegades Of The Empire" about the creation of DirectX and Chromeffects, an early effort by Microsoft to create a multimedia browser. Today Alex is President and CEO of WildTangent Inc., a technology company devoted to delivering CD-ROM quality entertainment content over the Web.

People are as nutty about spyware as they were over the nonsense Y2K bug. At least the Y2K bug had a specific date on which the doomsayers we're proven to be completely off their rockers, but the spyware witch hunt will last for years. In all great hysterical phenomena, it's important to have a completely ambiguous and indefinable enemy, whether it's "witches," "communists," "the Y2K bug," or "spyware."

The most ironic part of the spyware debacle is the role Microsoft plays in it all. Microsoft is the leading adware and spyware technology vendor and it profits from the spyware hysteria by using your fear as justification for blocking distribution of competitive software services—and giving itself permanent background access to your desktop in the name of closing "security holes."

Recently the media reported that Microsoft was making overtures to acquire the Internet's original spyware company, Claria, and subsequently downgraded Claria's spyware rating from "remove" to "ignore" in its own spyware removal product. Microsoft's Spynet Web site claims that Claria's status was changed after it filed a request for Microsoft to re-evaluate some of Claria's products. I know from experience that nobody in this group responds to anybody without a letter from a lawyer first.

As another example of Microsoft's hypocritical efforts to "protect you from spyware," take a close look at Microsoft plans for its new Spynet service. Does the maker of the Windows OS and IE browser define clear technical criteria for what constitutes spyware so that its entire developer community can adhere to some standard? Does it cut through the cloud of consumer ignorance and confusion to help clearly identify and remove malicious software? No, it launches a service that decides what software will be categorized as "spyware" based on how technically uninformed consumers, speculating on the Internet about real and imagined spyware, VOTE. Meanwhile the leading spyware vendors are already hiring companies in India to flood Spynet with bogus reviews for their software.

There is a lot of power and value for Microsoft in having no good definition of spyware. Today, I'm going to spoil all of that. I'm going to define "spyware" in terms that are clear, unambiguous, easy for anybody to understand, and simple for Microsoft or any spyware removal product to enforce, thus eliminating the ambiguity they profit from. This is the short version: Spyware is any software that does not provide the consumer with adequate knowledge, consent, and control over its behavior on their machine.

Knowledge

- Is the software's creator a real company?
- Does it have a published address and contact info?
- Is the software clear and explicit about what it does?
- Is the software clear and explicit about any personally identifiable data that it may gather?
- Does the software present a clearly written EULA and privacy statement on installation?
- Does the software lie or attempt to mislead the user?

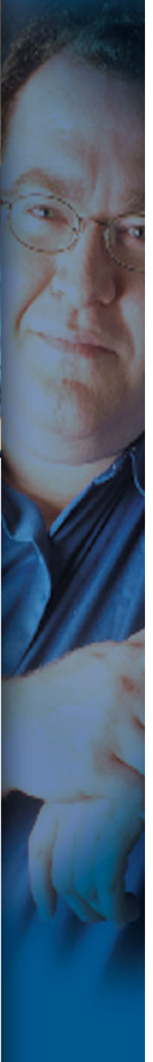
Consent

- Is the software voluntarily and proactively installed by the consumer?
- Is the consumer asked for consent before any personal data is collected?

Control

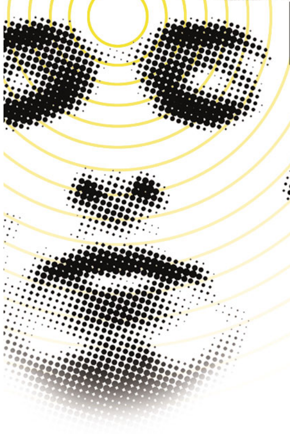
- Can the consumer fully and cleanly uninstall the software using the standard Windows uninstall Control Panel with a single offline acceptance click?
- Can the consumer easily find and disable any data tracking, updating, or background features?
- Can the consumer easily prevent the software from engaging in any intrusive messaging?

Any software that can honestly answer "Yes" to all of the above cannot be spyware. This is a definition almost anybody can understand and enforce and absolutely all software should be held accountable to. I may not like the way a given software product tries to extract value from me, but as long as I have knowledge, consent, and control, it's my choice. ▲



> The most ironic part of the spyware debacle is the role Microsoft plays in it all.

Send your thoughts to TheSaint@cpumag.com.

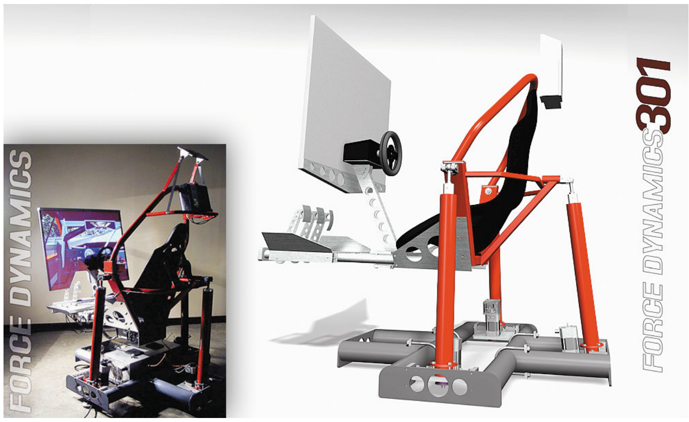


DREAM HARDWARE

These Gizmos Don't Sing It, They Bring It

Who will watch the watchers? Friedrich Dürrenmatt and others might have kittens over Sandia Labs' new eye in the sky, but we'd certainly trade the litter for the acuity of Samsung's latest digicam. We also like to feel what we see, which is where a Force Dynamics racing sim comes in.

by Marty Sems

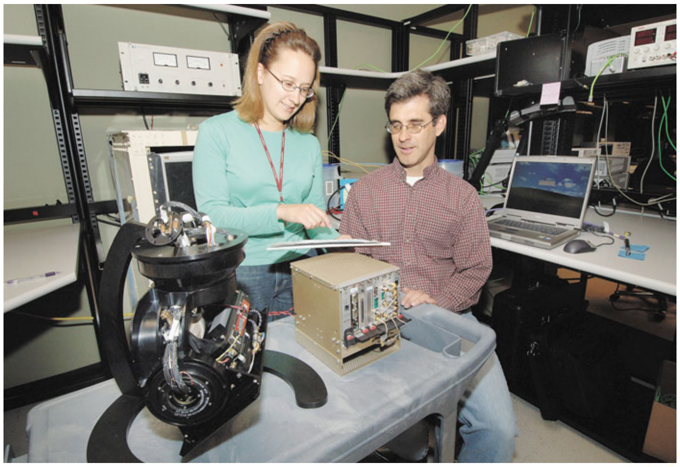


Force Dynamics 301

You won't see any fat-font NASCAR driver numbers in the corners of our car windows, but we still crave Force Dynamics' 301 race simulator (www.force-dynamics.com). It complements existing games rather than being locked into one custom sim. So far, the AMD-based 301 has been optimized for Live For Speed, NASCAR 2003, and Richard Burns Rally. Fast response time and a raised center of rotation make the platform more realistic, Force says, and less likely to make you blow your lunch on Turn 4 (which does make an effective deterrent for the guy drafting behind you). The 301 is smaller than the FCS Hexatech (June 2005 *CPU,* page 16), but more importantly, a tricked-out version only costs a tenth as much ($30,000).

Samsung Pro815 Digimax

It isn't the Pro815 Digimax's price that is dreamlike ($859; www.samsungcamerausa.com) but rather its list of bragging points. Samsung gave this camera a 15X optical zoom, which trumps the image quality of even the best digital zoom. The 3.5-inch LCD on the back is likely the biggest you'll find at this writing and partly explains the need for such a huge, 500-shot battery capacity (1900mAh, 7.4V lithium). The 8MP Pro815 may be out by the time you read this. And we'll be out showing it off.



Sandia National Laboratories MiniSAR

"I am the eye in the sky/Looking at you." Legend has it that the Alan Parsons Project was singing about a Philip K. Dick novel, but Sandia's researchers might have been humming the same tune when they recently tested the MiniSAR (www.sandia.gov). The lab says it is probably the world's smallest fine-resolution synthetic aperture radar. Intended for aerial surveillance, the MiniSAR can process real-time imaging from about 20,000 feet with a resolution of four inches. In other words sombreros and other wide hats are the order of the day. Cheaper to build than today's much heavier SARs, the prototype nevertheless cost about $200,000 to $250,000 to build, says researcher Dale Dubbert. The cost should drop once Sandia finds a manufacturing partner. See you then.

Power & Performance

Nine PSUs Stressed Out & Tested

With dual graphics cards, blazing CPUs, fans, multiple hard drives, and more, it is a miracle PSUs even work. Well, sometimes they don't. In general, look for two things when buying a next-gen PSU: EPS12V support and/or NVIDIA's SLI certification.

EPS12V is an 8-wire update to the conventional 4-wire ATX12V feed dedicated to your CPU. EPS12V is common in dual-processor servers and workstations, which makes sense. If a 4-wire feed can power one CPU core, you probably need an 8-wire feed for two. EPS12V is still overkill on the desktop, but not for long. SLI certification isn't always a guarantee of sufficient PSU quality, but it's the best measure we have now to know a PSU can meet near-term dual-graphics needs.

Our concern here is the +12V rail. To meet 18A safety limits on the number of amperes that can reach a user-accessible contact, the +12V line is split within the PSU. Thus, specs show 12V1, 12V2, etc. Older ATX 1.0 PSUs featuring 20-wire ATX power connectors only have one 12V line—inadequate for a performance-hungry world. Even a PSU with two 12V rails doesn't guarantee the total amperage is sufficient for an enthusiast configuration.

How We Tested

My primary focus was stability and not silence. In some ways my testing exceeded NVIDIA's SLI-certification process. For example, NVIDIA generally tests with one hard drive; I tested with four for a heavy draw during startup. These drives average about 1A each on the +12V rail. Two 6800 GT cards add about 24A on the high side. My 3.8GHz Intel P4 570 packs another 12A, for roughly 40A across all +12V rails. Some PSUs only spec 38A on the +12V but perform fine, denoting a healthy margin of conservatism. Other vendors appear to be fudging their numbers a bit. Intel specs for DC output require an 11.40V minimum and 12.60V maximum on a +12V rail and 4.75V min and 5.25V max on the +5V rail. All our PSUs fell well within these ranges.

My test platform had an ASUS P5ND2-SLI motherboard, four 512MB PC2-5400 modules, a 16X DVD burner, and Intel's Prescott reference heatsink. I took continuous voltmeter measurements during three periods, the first from power on to idling on the Windows XP desktop. The second was a 30-second span of Desktop idle. The third was the period from moving from idle to loading Prime95 and then launching, completing, and exiting 3DMark05's Return to Proxycon game. By hammering the CPU and SLI subsystems, I aimed to maximize strain on the +12V rail. ▲

by William Van Winkle

TrueControl II 550W
$159.95
Antec
www.antec.com

CPU CPU CPU C

Antec TrueControl II 550W

The TrueControl family is popular with overclockers who want a quick, easy way to adjust voltage levels on the +3.3, +5, and +12 rails. Antec defaults to running slightly undervoltage but well within spec. After initial testing, I dialed the +12V line closer to the ideal level of 12.1V and reran the tests. The PSU showed exceptionally solid voltage regulation, even through boot-up. With one bottom-intake 120mm fan, the only sheathing here is the 24-pin ATX connector bundle. The power connector has the popular detachable 4-wire connector for easy adaptation to mobos with 20-wire ATX connectors. The PSU is rated at a hushed 21.3dBA, though you can control fan speed via a bay-mounted panel. With four SATA and five 4-wire Molex connectors, separate PCI-E lines, and more, this is a strong performer.

TruePower II
$149.95
Antec
www.antec.com

CPU CPU CPU CPU

Antec TruePower II (TP2-550EPS12V)

You could easily mistake this PSU for the TrueControl. Most basic specs, including the noise level, are identical. The primary difference, apart from an 8-wire connector behind the 4-wire connector on the 12V line, is that TruePower replaces the 120mm bottom fan with a bottom intake fan and exhaust fan in the back. There's little bling, but Antec puts its gold where it counts—in the connectors. Given their similar construction and almost identical voltage stability, it's interesting that the TruePower's voltages are almost perfectly set out of the box, while the TrueControl's are a bit lower. This may be to give TrueControl buyers something to do after installation to justify the additional $10 cost. I'd rather save money, keep the PCI-E performance, and gain this unit's EPS flexibility.

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Real Power 550
$129
Cooler Master
www.coolermaster.com

Cooler Master Real Power 550 (RS-550-ACLY)

The Real Power 550 is ATX12V 2.01 and EPS12V 2.1 compatible but not SLI certified, and the test numbers show why. The PSU has a +12V combined peak amperage of 48A, which explains why I could boot and operate normally. But the 30A continuous load rating doomed this unit under our load test. Still, if you're not worried about dual graphics, this is a decent unit for the bling-minded. The black finish and blue-lit 120mm bottom fan look hot behind a clear case panel, and a blue-lit "human computer interface" provides an analog wattage meter that mounts in a 3.5-inch bay. There are three SATA connectors and six 4-wire Molex connectors outfitted with little clips to help push the connector out of its plug—clever but a pain when the auxiliary mobo power plug sits adjacent to the PCI-E graphics card. Rated at under 23dBA in silent mode, this is a good unit for mainstream, single-slot buyers.

Noisetaker AX 2.0
$189.99
Enermax
www.enermax.com

Enermax Noisetaker AX 2.0 (EG701AX-VE SFMA 2.0 SLI 600W)

Enermax echoes Antec here by pulling out a solid performance under load, despite a vendor-stated combined power rating of 35A on the +12V rail. I was a little surprised by the amount of voltage variance it exhibited during boot, but it's nothing to freak out about. The unit's dark, metallic-blue finish is slick but won't match most cases. Enermax does add screw holes on the top for chasses that support heavy PSUs from those points. Sheathing wraps all the cabling into three bundles but only extends to near the end of the bundle on the 20/24-pin ATX power connector, making the others look a bit penny-pinched. You get four SATA and seven Molex drive connectors, a magnetic shielding ring, and a speed dial for the bottom and back fans, which run two minutes or longer after shutdown to cool components. After weighing specs and performance against price, this PSU is a fair deal but not stunning.

PowerStream OCZ-600ADJ
$199
OCZ
www.ocztechnology.com

OCZ PowerStream OCZ-600ADJ

The PowerStream is the crown jewel of sub-$200 PSUs here. With its semi-matte mirrored finish, black meshed cabling, and green-lit interior, it's as beautiful as it is robust. OCZ defaults to having just a smidge of overvoltage out of the box, but you can adjust these with recessed rail controls located above the power switch. Nearby LEDs indicate voltage within ±5% spec (green), undervoltage (yellow), or overvoltage (red). The unit whispers at 23dBA under a 60% load. The 600W fits an 8-wire EPS12V plug by snapping together two 4-wire connectors. These can separate to handle ATX12V connectors, and only one of the 4-wire connectors will fit. OCZ uses a 20/24-pin ATX power connector instead of a straight 24-pin with an add-on adapter. Because this isn't an SLI-sanctioned PSU, there's only one 6-wire PCI-E connector, but there are two dedicated Molex connectors apart from the six and a PCI-E adapter. As our results show, the plugs are probably all that holds this unit back from certification. This PSU's only drawback is having two SATA connectors rather than four.

850 SSI
$469
PC Power & Cooling
www.pcpowercooling.com

PC Power & Cooling 850 SSI

After testing this unit, I found myself muttering, "Yess, my precioussss . . ." This is the one PSU to rule them all, outfitted with 850W of continuous fury and *four* 17A +12V rails. Yes, it costs more than some PCs and may require a different chassis to meet its dimensions, but the 850 SSI's MTBF is triple that of most competitors, and you get six SATA and eight Molex connectors on abundantly long, fully black mesh wrapped cable bundles. In the top tier of PSUs for stable voltage regulation, the 850 SSI defaults to nearly perfect voltage levels. Looking at test results, you might conclude that this unit is on par with Antec and OCZ, but it's in a league by itself. Just pop off the cover and compare the size and amount of circuitry in this tank with any other PSU. The 850 runs quietly, efficiently, and with nary a ripple. You won't find a more future-proofed PSU for sale today.

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

CPU CPU

ST65ZF
$179
SilverStone
www.silverstonetek.com

SilverStone ST65ZF

The ST65ZF should have been a monster; it's rated for 650W continuous at 50 degrees C, not the usual 25 or 40 degrees C. SilverStone builds in four +12V rails and seems to do everything right on paper. I saw a little higher than normal amount of +5V wiggle during boot, but nothing alarming. But there were hints. The PSU's housing is looser than most and may creak a little if you squeeze it. SilverStone specs a 29dBA minimum noise level, but this was easily the loudest PSU I tested, even at idle. Under load, well, the ST65ZF locked up—repeatedly. Four SATA and six Molex connectors, plus attractive black mesh on the major power cables, can't make amends for the unnecessarily high price. I'd like to think that I received a stray lemon, but be careful anyway.

PurePower 680W
$179
Thermaltake
www.thermaltake.com

CPU CPU CPU CPU

Thermaltake PurePower 680W

Thermaltake's rainbow-like cable meshing doesn't go well with this unit's cool matte-mirror finish, but it can make finding the right connector easier in a crowded chassis. More impressive are the 10 Molex connectors (and four SATA). You don't even need to devote any to graphics, as the orange cable has two 6-wire connectors. I usually frown on having both PCI-E connectors on the same cable (for noise and instability reasons), but the results showed that Thermaltake made a good call in this case. This was the only PSU with a rear intake fan. Normally, I prefer bottom intakes, but given the number of drives this PSU seems ready to fuel, a rear intake may make more sense. I don't know why the PurePower 680W isn't SLI certified yet—it's very stable, capable, and quiet, and has a huge 50A +5V rail—but hopefully it will be soon. The MSRP is a pinch high, but a sub-$150 street price makes this an attractive PSU.

ION 2 460W (VAN-460N)
$69
Vantec
www.vantecusa.com

CPU CPU

Vantec ION 2 460W (VAN-460N)

Vantec reps said they'd send me an SLI and/or EPS12V PSU, but the ION 2 bears no EPS12V connector and only one 6-wire PCI-E connector, never mind NVIDIA's logo. Still, as it was pretty close to NVIDIA's recommended 480W minimum, I slapped on a double Molex-to-PCI-E adapter and tested it. The results were worse than predictable. With only 30A on a single +12V rail, the ION 2 failed under load on cue. The voltage variance I saw in this unit was the widest here, especially when loading the Windows Desktop environment. This was also the only PSU that showed voltage wiggle when sitting idle, and my system repeatedly locked either loading or running the stress test. With a black matte finish, silver grill over the 120mm bottom fan, and black mesh sleeving, the ION 2 looks good but proves you get what you pay for.

** To see our review of the Sea Sonic SS-600HT, subscribers can go to www.cpumag.com/cpusep05/psu.*

An Inside View Of Our PSUs

Looking for a next-gen PSU that can meet your power needs. One of these monsters can probably satisfy.

SLI & EPS12V Power Supplies

					Boot (+12V)		Boot (+5V)		Idle (+12V)		Load (+12V)	
PSU	Rating	EPS/SLI	Max +12V	Max +5V	Min	Max	Min	Max	Min	Max	Min	Max
Antec TrueControl II 550	550W	No/Yes	19A + 19A	40A	11.74	11.75	5	5	11.74	11.74	11.73	11.74
Antec TP2-550EPS12V	550W	Yes/Yes	19A + 19A	40A	12	12.02	5.07	5.08	12.03	12.03	12.02	12.02
Cooler Master Real Power 550	550W	Yes/No	12A + 20A + 10A	30A	12.05	12.18	5.09	5.11	12.09	12.09	Locks	
Enermax EG701AX	600W	Yes/Yes	18A + 18A	34A	12.07	12.18	5.16	5.17	12.11	12.11	12.02	12.07
OCZ OCZ-600ADJ	600W	Yes/No	20A + 20A	46A	12.18	12.21	5.16	5.16	12.18	12.18	12.16	12.17
PC Power & Cooling 850 SSI	850W	Yes/Yes	4 x 17A	30A	12.15	12.17	5.13	5.13	12.16	12.16	12.14	12.16
* Seasonic SS-600HT	600W	Yes/No	18A + 18A	30A	12.12	12.14	5	5.01	12.12	12.12	Locks	
Silverstone ST65ZF	650W	Yes/Yes	13A + 18A + 16A + 8A	24A	12.06	12.13	5.15	5.19	12.1	12.1	Locks	
Thermaltake Pure Power-680APD	680W	Yes/No	15A + 15A + 8A	50A	12.18	12.2	5.12	5.12	12.21	12.21	12.15	12.21
Vantec VAN-460N	460W	No/No	30A	30A	11.76	11.91	5.1	5.12	11.83	11.85	Locks	

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

CPU DOPING

FrozenCPU.com
authorized reseller of innovatek
www.frozencpu.com
1.877.243.8266

NVIDIA GeForce 7800 GTX

Specs: 302 million transistors, CineFX 4.0, 24 pixel shaders, 8 vertex shaders

After a solid few weeks of gaming and benchmarking NVIDIA G70-powered GeForce 7800 GTX cards, I'm here to tell you what I think. First, let me get the obvious commentary out of the way: These puppies are wickedly fast. So much faster and more efficient than the previous 6800 series of GPUs from NVIDIA, that under the right conditions, a single 7800 GTX can outperform a pair of 6800 Ultras in SLI mode. By that I mean don't spend $1,000 on graphics cards for previous-generation DX7 and/or DX8 class games. The 7800 GTX is geared for DX9 and then some at high resolutions with all of your favorite AA/AF eye candy turned on. It also eats more complex pixel shaders and is an AA monster. Clearly it's built for upcoming DX9 games based on PS3.0 and FP32. The early demos I saw included Huxley, UT-2007, and Age Of Empires III and looked absolutely stunning running with SLI.

NVIDIA says that the 7800 GTX is not a "refresh" of the 6800, and instead the pixel and vertex shader pipelines are redesigned and gentrified, whilst at the same time decreasing power consumption. The core is still based upon a 0.11-micron process, and even though the clock speed is bumped up 5MHz to 430MHz, it has 302 million transistors (up from 222 million), indicating some serious intentions under the hood. The pixel pipelines are also up from 16 to 24, and even the vertex pipelines are up to eight. That's some serious horsepower and torque, assuming that they were the same as the 6800s pipes, which of course they aren't. Peak pixel fill rate remains at 6.8Gpps (gigapixels per second), but the pixel texture fill rate is now capable of 10.32Gtps (gigatexels per second), which is up from 6.8Gtps on the 6800. Using a 256-bit memory interface, the clock speed for the GDDR3 memory is up to 1.2GHz, and peak memory bandwidth is up from 35.2GBps to 38.4GBps, which takes over from the previous champ (Radeon X850 XT PE) that boasted 37.8GBps.

But all those numbers that don't sound too impressive, save the fact that efficiency in the graphics pipeline is improved, NVIDIA actually spec'd out over 1,300 different shader operations from games past, present, and future to find out which were the most popular, required optimizations and could be improved by redesigning the shader units. Obviously NVIDIA isn't overly free with its secret sauce, but some things have been revealed, such as the scalar unit in the vertex pipeline that's now 20% more efficient and the vertex texture fetch unit that's received a boost. Also, the floating-point-texture processors are now jazzed up, which improves HDR capabilities and should come in handy for upcoming games. Also, the FP32 shader units are now able to cope with two Vect4 MAD (multiply-add) operations per clock.

Visually, there's a new AA mode, called Transparency Adaptive AA, which takes AA further on to alpha blended areas that previously didn't get the AA goodness in more traditional AA modes, such as multi-sampling. So, for example, all those chain-link fences set one behind the other that used to look blurry in Half-Life 2, now look more realistic.

One area in which I was particularly excited to see NVIDIA move forward is video acceleration features, dubbed Pure-Video. ATI has long been king in that department, but now NVIDIA has listened to end-user and OEM feedback and stepped up to the plate. The programmable video processor and its HDTV and MPEG-2 features are accelerated and sport 2:2 pull-down correction. The only issue is that I'm still awaiting the Force-Ware Release 75 driver in order to dabble, test, and play with PureVideo. And I'm especially happy to hear about its apparent CPU-utilization tweaks.

I look forward to seeing more games with DX9c-style Shaders, normal maps, HDR rendering, and floating-point textures. Clearly the best solution available is the 7800 GTX. ATI delayed its next-gen R520 architecture, but even so, it's going to take something mighty special from the company to even catch up to NVIDIA. ▲

by Alex "Sharky" Ross

The Numbers

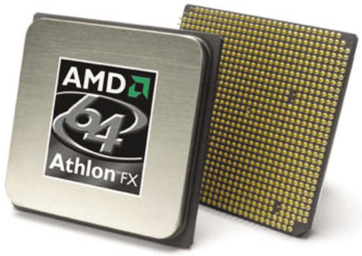
Benchmarks at 1,600 x 1,200

	Battlefield 2 Demo	Doom 3	Half-Life 2	UT2004
GTX 7800	54	57	122	73
GTX 7800 SLI	78	90	143	79
6800 Ultra	29	45	73	58
6800 Ultra SL	53	78	119	77
Radeon X850 XT PE	40	43	105	54

GeForce 7800 GTX
$599
NVIDIA
(408) 486-2000
www.nvidia.com

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

AMD Athlon 64 FX-57



Another month, another speed bump from AMD. But when I'm dealing with super-high-end expensive gaming-targeted processors, do I care? Of course I do. Enter the new AMD Athlon 64 FX-57. I apologize right now for those of you with the FX-55 that was top of the charts for a few weeks. It's still silly fast but not quite as fast as this replacement.

Based upon the very successful Athlon 64 939-pin platform, and with 1MB of L2 cache at its disposal (as is the norm for these FX's), the FX-57 clocks at 2.8GHz. AMD is rapidly approaching the 3GHz mark that Intel set sometime ago, but the only difference is that, clock for clock, the boys in green are so much more efficient in almost every department.

AMD didn't just bump up the clock speed by 200MHz for the FX-57 over the FX-55, it threw in a few extra tweaks for even more performance. You certainly get what you pay for when spending around $1,000 (actually $1,031 in quantities per thousand) on a CPU. But who in his right mind would do such a thing anyway? The introduction of the FX-57 will not mean the death of the FX-55, and even the price remains the same at $827, so you need not feel too bad if you shelled out that amount recently. However it's rather odd for the price to remain stagnant, especially for AMD, and it certainly won't please AMD enthusiasts that have supported the company through thick and thin.

The core itself is a revised K8 core (codenamed San Diego) with a die shrink thrown in for good measure, down from 130nm to 90nm. It's similar to previous Athlon 64 X2 cores based on the San Diego, with all of the same E-K8 revisions with both SOI process and Dual Stress Liner technologies.

The die shrink obviously helps FX processors run faster, suck up less power, and even cost less to manufacture than the 130nm cores. The FX-57 can achieve its increased clock speed while maintaining the same 104-watt TDP as the FX-55 (in large part due to this die shrink), and the nominal core voltage sits at 1.4 volts.

Having said that, I didn't have any real luck overclocking the FX-57, which was disappointing considering the die shrink. It kind of ran at 3GHz with improved cooling, but perhaps later revisions will run above and beyond that mark more stably.

As with other Rev E chips, the FX-57 AMD has SSE3 instructions, along with a more flexible memory controller (letting you use different size DIMMs on the same channel) and improved memory mapping (more efficient use of memory space) and loading (you can now populate memory with double-bank DIMMs with no sacrifice in performance).

My benchmarks helped to demonstrate how potent the FX-line remains at gaming. No Intel CPU can come close in that department. Games such as UT2004 or Painkiller are especially CPU-bound and benefit from the bumps that FX-57 provides; of course any FX processor performs extremely well and it just depends on how badly you want those bragging rights.

Furthermore, just when I thought playing Battlefield 2 with a dual-core X2 and SLI 7800 GTX cards was the "right" thing to do for the price, the performance figures bring me back down to my gaming roots. Yes folks, the FX-57 is fast, and it absolutely makes me forget about all things multithreaded; therefore, I would say that 99.9% of you should go for the more forward-looking dual-core technology in the form of the Athlon 64 X2 4800+, especially since it's so much more affordable. However, for that 1% that needs 1,500HP, a two-stage nitrous setup, and single-digit quarter-mile runs for gaming, go for the FX-57. Just remember that it's part of a dying breed in terms of single-core processors. ▲

by Alex "Sharky" Ross

Benchmark Numbers

	FX-57	FX-55	X2 4800+	Intel P4 3.46EE
Sysmark 2K4: Communication	161	153	151	141
Sysmark 2K4: Document Creation	233	214	198	215
Sysmark 2K4: Data Analysis	158	151	146	174
Doom 3	110	108	103	96
UT2004	84	77	73	64
WinZip (lower is better)	372	388	401	351
Windows Media 9 (lower is better)	319	347	364	341

Specs: 2.8Ghz, 90nm, SOI process

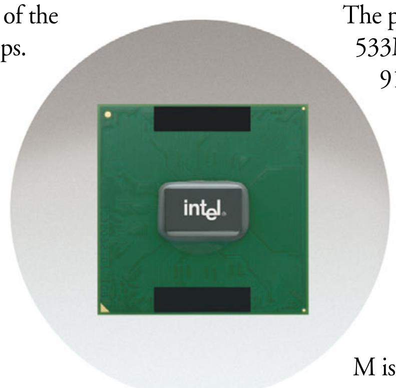
Athlon FX-57
$1,031
AMD
(951) 674-4661
www.amd.com
CPU CPU CPU

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Intel Pentium M 770

Pentium M 770
$637
Intel
(408) 765-8080
www.intel.com

Intel's Pentium M is a silent beast. On one hand, the very fastest 2.13GHz model boasts a thermal design power of 27W, which is a fraction of the dual-core Pentium D chips. It will even run passively without a cooling fan under the right conditions. The Pentium M architecture is efficient at accelerating game performance and posts numbers that rival Pentium 4 and Athlon 64 systems.



The Pentium M combines efficiency and muscle to power through software without relying on inflated clock frequencies. The architecture is tweaked for speeds up to 2.13GHz. It wields a 2MB L2 cache as a means of shifting reliance from memory accesses and further augmenting overall performance.

The processor interfaces with a 533MHz FSB through Intel's 915-series of mobile chipsets. Performance clearly improves by virtue of the faster bus speed and extra bit of operating frequency. Of course, it's still important to establish a balance.

Although the Pentium M is small and runs at a reduced clock rate, Intel still charges upwards of $650 for a boxed retail processor, and that's on top of the other platform components you'll need for a complete Socket 479 system. Yet, if you're building an ultra-quiet home theater machine or a DIY notebook, the Pentium M 770 is your fastest option. ▲

by Chris Angelini

	Pentium M 770 2.13GHz	Pentium M 755 2GHz
Dr. DivX		
(845MB VOB, 1,000Kbps, 1-pass)	16:57	18:10
WinRAR (500MB folder)	4:48	5:28
PCmark 2004 Build 1.3.0	4234	3907
CPU	4140	3790
Memory	3474	2948
Graphics	2580	2574
Half-Life 2		
1,600 x 1,200		
(High 4XAA 8XAF)	13.45	13.28

Specs: Dothan core; 2.13GHz; 533MHz FSB; 2MB L2 cache; 90nm manufacturing; Execute Disable support; Enhance SpeedStep

AMD Sempron 3400+

Sempron 3400+
$40 to $150
AMD
(408) 749-4000
www.amd.com

AMD's new Sempron 3400+ is an example of mainstream hardware. Endowed with many of the same building blocks that give Athlon 64 and Opteron processors their mojo, Sempron enables somewhat reduced performance at drastically lower prices. The 3400+, for instance, sells for less than $150 in Socket 754 trim. The other models naturally fall in place behind, dipping as low as $74 for a 64-bit Sempron 2600+ designed for the same interface.

The 3400+ runs at 2GHz and features a larger 256KB L2 cache, up from 128KB and half the size of many Athlon 64 processors. An integrated 64-bit memory controller supports up to DDR400 modules in single-channel configurations, while the 800MHz HyperTransport bus shuttles up to 3.2GBps of data bi-directionally.

Because the 3400+ centers around AMD's 90nm SOI Palermo core, it incorporates a number of features inherent to the latest Athlon 64 processors. SSE3 instruction support is one, as is an improved memory controller with mismatched DIMM recognition, better memory mapping, and improved load handling. A recent upgrade to 64-bit software support represents one more feature shared between Sempron and pricier AMD chips. Manufacturing advances have shrunk the Sempron die down to 84mm^2 and reduced heat dissipation to 62W.

Although it can't compete with AMD's Athlon 64 lineup, Sempron 3400+ offers a reasonable compromise between price and performance. It isn't for the hardcore gamer or media encoding junkie, but everyday business apps run just fine. While many may question the longevity of Socket 754, think of the Sempron 3400+ as a means to save money here and now. ▲

by Chris Angelini

	AMD Sempron 3400+	AMD Athlon 64 3200+
Dr. DivX	**19:12**	**18:05**
WinRAR	**4:56**	**4:31**
PCMark04 Build 1.3.0	**3826**	**4184**
Half-Life 2	**58.08**	**62.64**

Specs: Palermo core; 2GHz; 256KB L2 cache; 128KB L1 cache; 64-bit memory controller (single-channel); 1.6GHz HyperTransport link; Socket 754; 62W; 90nm manufacturing

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

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I've seen power. And while power is impressive, finesse is even more special. Add a healthy dose of style, and it isn't hard to see why Apple is still so popular, even in the face of a much larger PC incumbency. Case in point: the Mac Mini.

Anxious to get in on the mini market, AOpen recently unveiled a Mac Mini look-alike with some fairly impressive tech specs. The MZ855-II centers on Intel's 855GME mobile chipset and supports Pentium M processors at speeds of up to 2.13GHz. It boasts a pair of memory slots, each capable of accommodating 1GB of DDR400 RAM. Half-sized AGP and PCI slots give the platform some semblance of expandability. USB 2.0, IEEE 1394, Gigabit Ethernet, and a number of digital audio ports combine to enable much better connectivity than the Apple offering, too.

And although AOpen makes significant progress in the style and size department, the MZ855-II is about twice as deep and nearly two times heavier than the Mac Mini. It'd be hard to argue that AOpen has bested Apple with the XC Cube mini design. Though attractive, the XC Cube Mini still looks very much like a PC.

Then there's the issue of price; the MZ855-II XC Cube Mini retails for roughly $449. After adding a processor, hard drive, optical drive, and memory to that price, you may very well be topping a grand. On the other hand, Apple sells a fully loaded Mini for $599.

Perhaps more exciting than this 855GME-based XC Cube Mini is the Intel mobile 915-based version that's in the works and expected out within a month or so. Featuring PCI Express connectivity and a more advanced I/O controller, you can expect it to at least support SATA hard drives. ▲

by Chris Angelini

Specs: Intel 855GME chipset, Pentium M support up to 2.13GHz, up to 2GB DDR400 memory, 1 AGP, 1 PCI, Gigabit Ethernet, 4 USB 2.0, 2 IEEE 1394, 9-in-1 card reader, 4.5 lbs

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Biohazard launched its most powerful gamer, the Nuclear Winter. Biohazard pulled out all the stops when it built our review unit; the Nuclear Winter boasts phase-change and watercooling, an overclocked processor, and a $1,050 paint job.

The new builder chose a 2.4GHz AMD Athlon 64 FX-53 instead of the FX-55 and FX-57 that have dominated the gamer scene lately. The FX-53 is no chump to begin with, but Biohazard took advantage of the VapoChill Extreme Edition XE's sub-zero CPU block and cranked the processor to 2.62GHz—slightly faster than the FX-55's default clock speed. This SHOC (Stable Hyper OverClock) is part of the package, so it doesn't void the Nuclear Winter's warranty. The Nuclear Winter also boasts SLI, thanks to dual 256MB eVGA GeForce 6800 Ultras and MSI's new K8N Neo4 Platinum/SLI motherboard.

After looking at the array of power-hungry components that make up this rig, I'm surprised the system has only a 480W Antec NeoPower PSU. That the modular power supply isn't one of Antec's SLI-certified devices isn't a problem by itself: I'm certainly not opposed to using noncertified PSUs in SLI systems. That said, the industry offers powerful PSUs that will be relevant for years to come; a machine that pushes $8,000 should have one.

Biohazard housed the Nuclear Winter in the VapoChill's chassis but replaced the bulky front panel with a slick custom front panel. Our review unit had a prototype front panel that was slightly small, but Biohazard assures us that it now has the correct front panel size.

The Nuclear Winter handled our benchmarks well. Despite the older CPU, the rig bested the FX-55/GeForce 6800 Ultra SLI-wielding Alienware Aurora 7500 in 3DMark05 at just two points shy of 10,000.

The Nuclear Winter is without a doubt a real gaming beast, but it has some rough edges. Biohazard backs up the computer with a three-year warranty that includes 24/7 tech support and on-site service. ▲

by Joshua Gulick

Benchmark Digits	
3DMark05	9998
PCMark04	4688
PCMark04 CPU	4806
PCMark04 Memory	4554
PCMark04 Graphics	7609
PCmark04 HDD	6086

Specs: 2.4GHz AMD Athlon 64 FX-53 at 2.62GHz, NVIDIA nForce4, 3GB Corsair XMS DDR400, 2 eVGA GeForce 6800 Ultra 256MB, 2 Maxtor DiamondMax 300GB, Plextor PX-716A DVD±RW, Sony CRX320E CD-RW

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

CRU-DataPort DP25

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Maybe you need storage you can bounce from machine to machine at higher speeds than USB or FireWire. CRU's DataPort 25 lets you mount two 2.5-inch drives into a carrier, slide the carrier into a frame that mounts into a PC's 3.5-inch floppy bay, and run the drives in a RAID configuration. The frame's back offers one PATA and two SATA connectors, while frames come in SATA or PATA versions. I loaded in two 60GB Hitachi 7K60 PATA drives (7,200rpm) and learned why I should read the manual: The lock that keeps the carrier in the frame also doubles as the power switch, and the frame won't convert PATA drives in a PATA carrier into SATA. A CRU rep tells me, though, that CRU's exploring a follow-up product with this capability.

I fired up an ASUS P5ND2-SLI board and configured the two DP25-mounted Hitachi drives as a striped RAID 0. Hardware installation and configuration takes five minutes. I then tested these against a 400GB Seagate external hard drive running on a 1394a interface and a 320GB internal Western Digital Caviar SE, which takes advantage of NVIDIA's 300MBps SATA controller. The WD drive toasted its rivals, but the DP25 RAID decisively doused the external drive, particularly in prolonged transfers.

Market trends show that 2.5-inch drives are rocketing in popularity. The DP25 (sub-$100 street price) is a great example of how you can put those drives to good use on the desktop, particularly in small form-factor systems. ▲

by William Van Winkle

CRU-DataPort DP 25 Tests

	PCMark04 (MBps)				2GB Copy	
Vendor	XP Start	App Load	File Copy	HDD Usage	Write	Read
CRU-DataPort DP25 RAID 0	5.715	5.579	26.84	4.745	1:16	0:45
Seagate 400GB External 1394a	6.159	5.664	5.201	3.375	1:42	1:23
Western Digital	9.954	8.215	40.341	6.398	0:49	0:43

Specs: Dimensions (removable carrier): 1 x 3.1 x 5.2 (HxWxD); interface: frame is 1 PATA, 2 SATA, carrier is either SATA or PATA; interconnect rate: 25,000 insertions; power: standard 4-wire mini Molex (floppy)

XFX Revo64 SATA Controller

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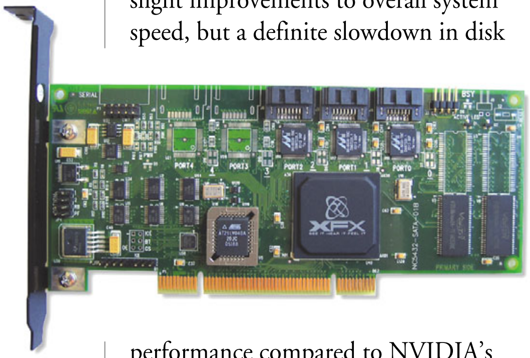
Remember back when 3D accelerators first emerged? Well now XFX is selling a card featuring a storage processor designed by Netcell.

Hardware-accelerated storage technology offers a few unique features otherwise unavailable on existing southbridge controllers. To begin, XFX's Revo64 is completely driverless. Windows installations go off without a hitch (no more F6), and migrating data is a simple matter of disconnecting an existing hard disk from your integrated controller, say, an nForce4 SATA port, and attaching it to the Revo. No worrying about reformatting; very cool.

RAID 3 is the other notable differentiator. Compared to RAID 5, block-level striping with distributed parity, RAID 3 reserves one of the three disks for parity, while the other two form a RAID 0-ish stripe. Should one drive fail, performance continues at full speed, while rebuilding with a replacement (hot swap) drive takes place in the background.



Synthetic tests in PCMark04 reveal slight improvements to overall system speed, but a definite slowdown in disk performance compared to NVIDIA's built-in nForce4 hard drive controller. My real-world WinRAR compression metric demonstrates better speed, though. Representatives at Netcell confirm the NC3000 processor handles large file transfers better than small, appealing especially to media encoding enthusiasts. Processor utilization in both tests was pegged at 100%.

For a first-generation product that doesn't require any software developer support and effectively accelerates performance as it enables effective data security, the XFX Revo64 is solid. And if three ports aren't enough for your massive collection of hard drives, XFX also sells a 5-port version that accommodates four storage drives and one parity drive. ▲

by Chris Angelini

	XFX Revo64	NVIDIA nForce4
PCMark04	4086	4063
HDD Test	4214	5341
WinRAR 500MB	4:24	4:33

Specs: Netcell NC3000 storage processor; 64MB SDRAM data cache; 3-port SATA capacity; PCI host interface; 300MBps max burst rate; RAID 0, 1, 3, and JBOD

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Anand's Corner

by Anand Lal Shimpi

NVIDIA GeForce 7800 GTX

Made For High Resolutions & Fast CPUs

Just about a month ago, NVIDIA introduced its GeForce 7800 GTX, the latest $600 graphics card to completely redefine gaming performance. Unlike previous high-end GPU launches, the GeForce 7800 GTX offered enough performance to make me even recommend it—whereas I usually tell people to stay away from the highest-end GPUs and focus on the upper midrange offerings instead.

The 7800 GTX offers gaming performance on par, if not greater than, a pair of GeForce 6800 Ultras running in SLI mode, yet it consumes less power than just a single one of those cards. Not to mention that the 7800 GTX is a single slot solution. So in other words, NVIDIA has basically been able to cram the power of what used to take up a total of four slots, into a single, very quiet package.

The 7800 GTX is still extremely expensive for the vast majority of users; although prices have fallen close to the $550 point (with some clever deals landing you a card for just over $500), that's still a lot to ask for a video card. After all, Sony's PlayStation 3 will cost less and feature a slightly higher-clocked version of the same GPU.

But there is one category of user who cannot only appreciate the beauty of the 7800 GTX, but also almost demand its level of performance. Who would those users be? Gamers with massive LCD monitors, of course. The problem with LCD displays is that they look tremendous at their native resolution, but once you stray from that, the image quality degrades significantly.

Now this isn't a problem for the majority of LCD displays, because most of them have a maximum resolution of 1,280 x 1,024, but if you've put down good cash on a higher-end, 21-, 24-, or 30-inch display, then you're not constrained by such mortal resolutions. Dell has done its civic duty of making people upgrade to some quite beautiful LCD displays with native resolutions of 1,600 x 1,200 or 1,920 x 1,200 by offering product at ridiculously low prices. These days you can pick up a 24-inch widescreen LCD from Dell, with a native resolution of 1,920 x 1,200, for under $900. The 20-inch version? Less than $500.

Prior to the launch of the GeForce 7800 GTX, if you wanted to play every single game out there at 1,600 x 1,200 or 1,920 x 1,200, you'd need a pair of 6800 Ultras. But now, with the introduction of the 7800 GTX, a single card is all you need. Gamers who want to be able to run at their massive LCD's native resolution now have a place to turn with the 7800 GTX. If your PC budget is similar to the MSRP of an entry-level Kia, then also rest assured that you can pair up a 7800 GTX with Apple's 30-inch Cinema Display, which features a native resolution of 2,560 x 1,600. Once you hit resolutions as high as 2,560 x 1,600, it may be time to switch to a pair of 7800 GTXs, but I've found that a number of games are quite playable (just not butter smooth) at that resolution with just a single 7800.

Because the 7800 GT is significantly faster than any single GPU we've seen in the past, it requires an extremely fast CPU to truly flex its muscle. But how fast of a CPU do you need? The answer to that question really depends on your target resolution. I've found that at 1,920 x 1,200 (or higher), you end up being GPU-limited in pretty much all games with a single 7800 GTX, meaning that even an entry-level Athlon 64 3000+ is going to be able to feed the GPU relatively well. That being said, even those high resolutions aren't totally GPU-bound, and you'll still see a performance boost from going to a faster CPU.

If you happen to have a display that's limited to 1,600 x 1,200 or 1,680 x 1,050, you end up being more CPU limited—in which case a midrange Athlon64 would be what you'd need to feed the beast. The 7800 GTX isn't for everyone, but as is the case with most anything at the ultra high-end, it sure is nice to talk about. ▲

Talk back to Anand@cpumag.com.

Anand Lal Shimpi has turned a fledgling personal page on GeoCities.com into one of the world's most visited and trusted PC hardware sites. Anand started his site in 1997 at just 14 years old and has since been featured in USA Today, CBS' 48 Hours and Fortune. His site—www.anandtech.com—receives more than 55 million page views and is read by more than 2 million readers per month.

> The 7800 GTX offers gaming performance on par, if not greater than, a pair of GeForce 6800 Ultras running in SLI mode . . .

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Photo courtesy of Omar Attum Photography and stored on a Kanguru Media X-change.
"Insert the memory card into the Media X-change, push copy, and the photographs are downloaded. I then transfer the photographs from the Media X-change to my laptop... It's that simple!" - Omar Attum

The Ultimate Battlefield 2 Rig

by Alex “Sharky” Ross

The past few months have seen the release of a slew of high-end, expensive, decadent, and downright gaming-friendly PC hardware. It’s really been awhile since I’ve gentrified my gaming system. Not since the days of Half-Life 2 and Doom 3 has my own system needed some extra beef. With the recent release of EA’s Battlefield 2, that goes right out the window. As wicked as it looks, it’s just as mean and taxing on your system. No longer is an FX-53 coupled with twin GeForce 6800 Ultras in SLI and 1GB of RAM enough for 1,600 x 1,200 with 8X AF and 4XAA. Not that a rock/paper/scissors, online, squad-based, first-person shooter such as Battlefield 2 requires those insane levels of detail, but it sure is nice to have, isn’t it?

First things first: out with the GeForce 6800 Ultras. Not that they perform poorly, it’s just that as a launch title, EA has obviously spent some serious time with NVIDIA, who has optimized the heck out of Battlefield 2 with the GeForce 7800 GTX. As with previous generation GPUs, it’s a good idea to double down and use a second board for SLI, especially if you’re into high-resolution gaming.

The AMD Athlon FX-53 is a processor I’ve been using for gaming for some time, and even with the release of the FX-55, the extra few megahertz wasn’t worth the trouble. However, the FX-57 certainly seems like a worthwhile jump. I know I’ve been saying that the dual-core X2 is a much better value and more future-proof, but the 90nm FX-57 is just so darn fast in gaming benchmarks. And with added SSE3 support, a tweaked memory controller, improved memory mapping, and that stonking 2.8GHz clock speed, it’s oh-so appealing. Not that the $1,000 price tag makes it anywhere near value for money but, then again, you can overclock it to 3GHz. Also, from some previous benchmarking, I’ve found that with a pair of GeForce 7800 GTX cards, anything less than the FX-57 and you draw the risk of not even pushing them at 1,600 x 1,200. As far as my platform goes, I’m sticking with the very sturdy ASUS A8N-SLI Deluxe motherboard.

One of the interesting (if not expensive) aspects of Battlefield 2 is that it actually performs better with 2GB of RAM as opposed to 1GB, due to its large memory footprint. Hence, it’s time to dip back into the pot and grab two 1GB Corsair XMS Pro DDR400s (that’s the one with those snazzy LEDs, in case you’re wondering).

On the outside, I’ve always been happy with Cooler Master cases, so the TAC-T01-E1C WaveMaster does the job. It’s not fancy in terms of watercooling properties, like a Koolance, but it more than gets the job done. To drive a PC for this gaming nonsense, a sturdy power supply is required, such as the Antec 480 NeoPower, which is also quiet at the best of times.

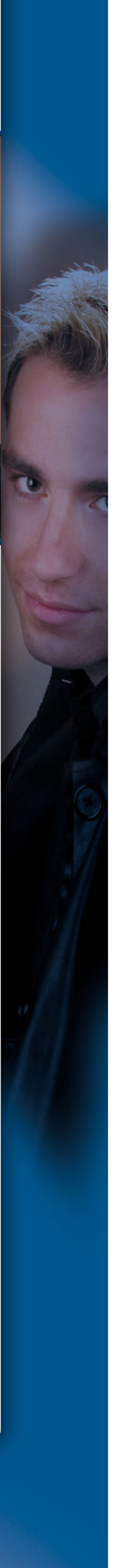
And I know it was only a couple of months ago that I mentioned the wonders of two mega-low response time Dell 2005FPW widescreen TFTs, but since, I’ve seen what a couple of 2405FPWs working together can do, and I’ve fallen in love. Certainly, 24 inches is better than 20.1, and widescreen gaming is the only way to play. One day, who knows, maybe games on the horizon will make use of that second monitor (in the meantime, it’ll sport some fancy Desktops).

Clearly this overpriced, extra-phat, and decadent PC is not something I would recommend for any sane person. Perhaps for hardcore gamers that at least know they have a problem, such as myself, and can’t help but buy/own the fastest gear on the planet (at least for the next five minutes anyway). All I have to show for this is almost 11000 in 3DMark05 at 1,600 x 1,200 with 4XAA and 8XAF; and Doom 3 ran at almost 170fps. Truly sad, but amazing nonetheless. ▲

Email me at sharky@cpumag.com

Disrupting Reuters’ newswire with a cheery Christmas greeting at age six, Alex “Sharky” Ross became an avid computer user/abuser, eventually founding popular hardware testing/review Web site SharkyExtreme.com. Exposing shoddy manufacturing practices and rubbish-spouting marketing weasels while championing innovative products, illuminating new technology, and pioneering real-world testing methods was just a front for playing with the best toys. The site acquired, he left in 2001. A London native and London School of Economics graduate, Alex currently overclocks/tunes Porsche 996 Turbos with www.sharkwerks.com when he’s not tweaking PCs.

> It’s really been awhile since I’ve gentrified my gaming system.



by Kyle Bennett

AMD's Athlon 64 X2: Dual-Core, Gotta Love It

I've been discussing dual-core desktop processors here on my own little page in *CPU* for months now. Talk is cheap, though. Thankfully, I've been on target with my thoughts, for the most part. Specifications being thrown around mean a lot of nothing to many of us, even though we hardware geeks still get off on them. As a technology journalist, and I use that term loosely, it's my duty to inform you about technology. Instead of regurgitating stats, which I grew tired of years ago, let me talk to you about my computing experience with dual-core CPUs on the market, namely AMD's Athlon 64 X2 dual-core processor.

I've been a huge fan of Intel's Hyper-Threading since its introduction. So much, in fact, that it pulled me back over to the "Dark Side," away from the AMD Athlon XP and, subsequently, the Athlon 64 line of CPUs. Around this time I was getting a bit longer in the tooth, and HardOCP.com started taking up much more of my time from a business perspective. The Web site that was spawned from playing games started to saddle me with such a workload that my gaming time was cut back severely. Irony? Anyway, with that workload came a triple monitor setup on my desk loaded with open applications. (I've actually had people laugh at the depth of icons in my System Tray.) It was at this time that Hyper-Threading became my friend. It allowed me a smooth, creamy user interface. Gone were the pauses, skips, stalls, and general quirkiness that would make using computer applications a nightmare. With Intel I gave up some power on the gaming front, though. I might not play games as much anymore, but I sure don't want gameplay to suck when I do. In fact, I've had enough hardware thrown at me over the years that I've become a bit of gaming snob. All that said, Intel's Pentium 4 still allowed me a good overall experience, but I knew that in the realm of fun, my Hyper-Threading machine was a solid B when I yearned for an A+. Yeah, a gaming snob.

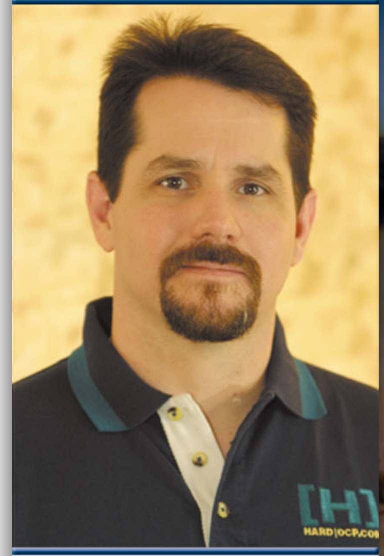
Intel was first to market with a dual-core processor, but its design was such a throwback in terms of megahertz that I simply wasn't willing to sacrifice even more gaming experience than I already was. So I waited a bit longer until I could get my hands on an Athlon 64 X2 dual-core. AMD's top-of-the-line 4800+ went into a new tower under my desk, along with a BFGTech GeForce 6800 GT OC video card and an ASUS A8N-SLI motherboard stocked with 2GB of Corsair RAM.

You might be wondering exactly why I put just one BFGTech 6800GT OC in my box when I had just gone through the trouble of installing all this new equipment in a new tower with an SLI-capable motherboard. This left me with a system basically the same as before, save the X2 processor and the motherboard, of course. Well, I set out to compare my overall computing experience on the Athlon X2 2.4GHz processor with my previous Pentium 4s at 3.73 and 3.6GHz. After a month of usage, I think I can put my finger on exactly what I think about AMD's new dual-core processor technology.

Concluding here, I want to be succinct: The AMD Athlon 64 X2 4800+ dual-core processor has provided me with the best overall computing I've ever experienced. In terms of that creamy, smooth user interface that Intel's Hyper-Threading afforded me, I would be hard pressed to say that the AMD X2 provided any better of an experience, but it's certainly no lesser. In terms of 3D gaming, the AMD X2 blows the best dual-core processor that Intel has to offer off the map. And last, but certainly not least, in terms of truly increasing my computing productivity, I don't think AMD Athlon 64 X2 dual-core can be bested.

Just remember this while you're kicking my butt online in Battlefield 2; it's due to me not having enough practice or hours logged. I'm seeing gameplay at 1,600 x 1,200 with all the eye candy turned on *and* I'm encoding a ripped DVD to DivX while you're kicking it. And yeah, I installed a 7800 GTX SLI. Damn gaming snobs. ▲

You can talk with Kyle at kyle@cpumag.com.



Kyle Bennett is editor-in-chief of HardOCP.com, one of the largest and most outspoken PC-enthusiast sites on the Web. HardOCP.com is geared toward users with a passion for PCs and those who want to get cutting-edge performance from their systems. Beware, though, Kyle is known for his strong opinions and stating them in a no-nonsense manner while delivering some of the most in-depth reviews and PC hardware news on the 'Net.

The AMD Athlon 64 X2 4800+ dual-core processor has provided me with the best overall computing I've ever experienced.

PC Modder

Tips & Tutorials

Modding does the body good. A PC's body anyway, inside and out. Here you'll find hardware, firmware, tools, tips, and tutorials for modding your rig's performance and appearance. Send us your own mod-related tips and ideas at modding@cpumag.com.

Modding enthusiasts have a penchant for the latest toys. Fast processors, powerful video cards, silent SFF enclosures, and radically lit motherboards are all fair game when it comes to a modder's creative mind. Recognizing the appeal of unconventional customization, an entire industry has emerged to support the community.

Mods & Ends

Ulti-Mat Original Mousepad

No matter how often we wash our hands or dust our desk, our mouse pad consistently acquires spots where the otherwise marvelous Logitech MX1000 sticks and stutters. Merely annoying on the Windows Desktop, such behavior is downright disturbing in Battlefield 2. The solution has been cleaning the pad thoroughly with dish soap once or twice a week.

That is no longer necessary with Ulti-Mat's high-end mouse pad ($42). Built from a 0.4-inch steel sheet and coated with three layers of Teflon, the surface is suitable for ball mice and optical engines alike. It's also scratch resistant and easy to wipe clean, should you have a similar habit of tracking in grime. Moreover, a 0.08-inch foam layer keeps the pad from slipping around under your hand. Dimensions of 11.82 x 9.85 inches are ample for unrestricted mouse movement.

The Ulti-Mat works with optical and ball mice thanks to a Teflon surface

The real question is how badly do you need a $42 mouse pad? Ulti-Mat believes graphics professionals and competitive gamers are the most likely customers. We don't necessarily fall into either category, but the improvement over our circular plastic pad is enough to warrant an upgrade.

Koolance NV2-L06 VGA Water Block

In the past few months, we've covered aftermarket heatsink and fan combinations for NVIDIA and ATI graphics cards. The goal is to reduce noise output while maintaining or improving cooling capacity. It should come as no surprise that watercooling offers an even better way to cut back on fan noise, simultaneously raising the bar for overclocking.

Koolance recently unveiled a NVIDIA-exclusive water block ($77) that works with 6800 cards from vanilla to GT to Ultra in AGP and PCI Express trims. The inlet and outlet nozzles both rotate 360 degrees for easy installation, and the mounting bracket snaps on without the need of any tools.

Not only does the block cover your 6800-class GPU, but it's also designed in such a way as to blanket the memory modules. The unit weighs eight ounces, looks great, and is easy enough for a beginner to install. What a great way to extinguish the fires of dual Ultras in SLI mode.

Zalman CNPS7700-Cu Heatsink

There is an increasing demand for noise reduction, especially as components get hotter and require more cooling. Processors are perhaps the worst offenders because of their high-speed 60mm fans, responsible for blowing air through a mass of copper. Zalman's designs run counter to all of that with larger fans, more heatsink surface area, and slower rotational speeds.

The CNPS7700-Cu ($50) is the epitome of what Zalman does so well. The unit features an all-copper body; a 120mm fan spinning between 1,000 and 2,000rpm; a controller that lets you manually tune fan speed; and compatibility with LGA775, Socket 478, and all Athlon 64 processors. The CNPS7700-Cu is a little pricey, but Zalman includes all the necessary accessories to mount the unit, secure the fan controller, and adapt to other socket interfaces.

Large and in charge, Zalman's 7700-Cu heatsink is as quiet as it is massive.

Fashionably Fresh Firmware

Traveler Slimline X5 v. 13.5.2005

The latest firmware for Traveler's 5.2MP X5 camera adds extended audio functionality to turn sound effects on and off.

www.traveler-service.com

ATI RADEON X800 XT Mac Edition v. 109

In certain instances ATI claims the X800 XT would corrupt or hang in Mac OS X. Firmware 109 corrects that issue for all X800 XT cards.

support.ati.com

VCS VideoJet 10

This firmware for VCS' video transmitter improves MPEG-4 resolution, optimizes the encoding engine for quality, adds watermarking, and allows telnet remote login.

www.vcs.com/english/index.shtml

Canon EOS 350D D-SLR v. 1.0.2

If you use a Canon EOS 350D or Digital Rebel XT camera, this update fixes problems with severe underexposure, auto power-off failure, and incorrect white balance when using an external flash.

www.canon.co.jp

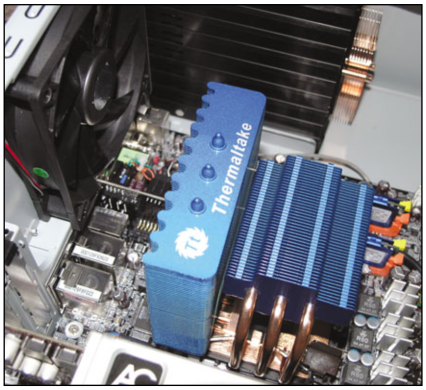
by Chris Angelini

"Silent But Deadly"

The Secret To Cooling Is In The Air, Part II

Last month (page 33) we outlined the products and components that we chose for a quiet-PC project that we dubbed "Silent But Deadly." Our goal was to build a system that generated as little noise as possible but that didn't sacrifice anything in terms of overall performance. We spent some time contemplating the list of parts we wanted, all the while considering how, or if, each part would help us achieve our ultimate goal of silence.

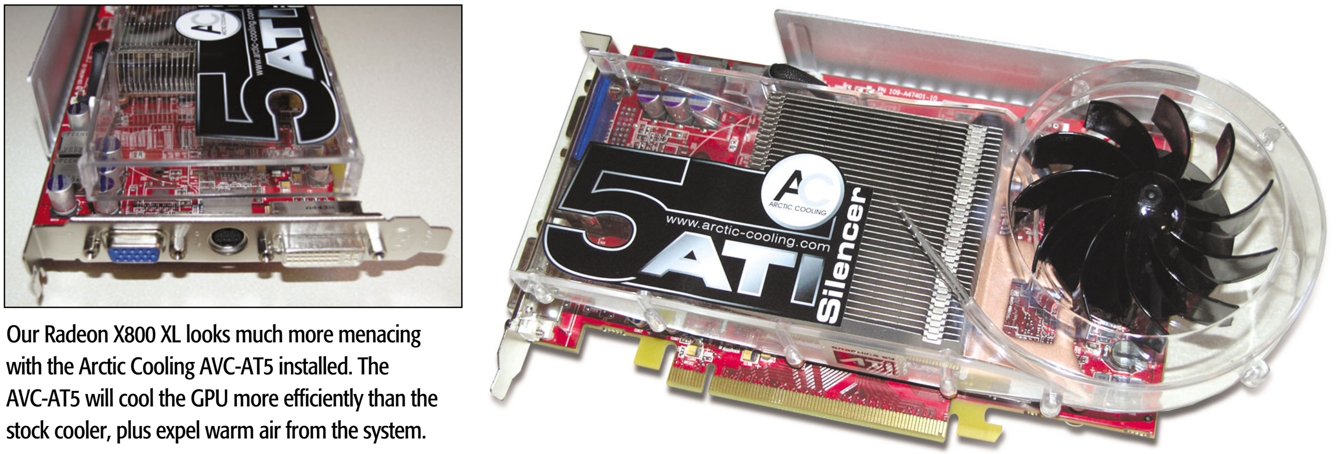
When we finally laid down our hard-earned green and ordered the parts for the build, we were confident that we had architected a system that would be super quiet but still had the horsepower to muscle through any application we threw at it. We couldn't know if we had succeeded, however, until we assembled all the parts and the system was fully functional. Unfortunately, all too often the virtual whole doesn't equal the sum of the parts when building a custom PC from the ground up using parts from multiple OEMs. Thus, we were quite eager to assemble "Silent But Deadly" when all the parts arrived in the lab, so we could see if we had made the right decisions in the planning stage.

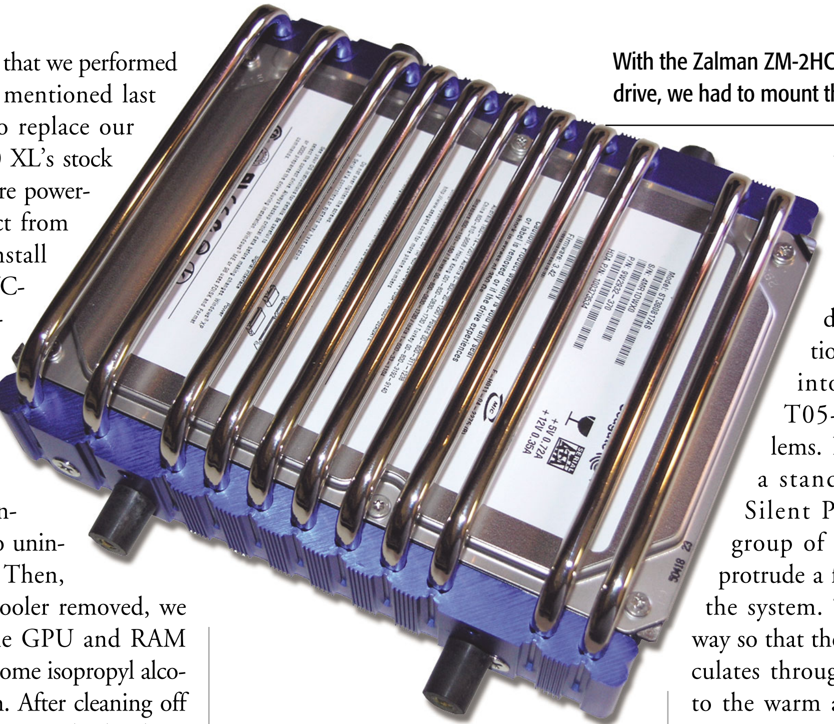

"Silent But Deadly's" 120mm exhaust fan is situated only a few inches away from the processor's passive cooler, ensuring constant airflow over the heatsink's fins.

Making The Mods

Before we could begin piecing the machine together, we needed to modify a few components. Surprisingly, the first modification that we had to make was one that was unexpected. The DFI LANParty NF4 SLI-DR motherboard that we chose for our project includes a small riser card that houses the motherboard's Realtek ALC850 audio codec. DFI calls this unique part its Karajan audio module. According to DFI, isolating the audio circuitry onto a separate module such as the Karajan improves audio quality by reducing electrical noise and interference. The problem we had with the Karajan module was that it wouldn't fit beneath the 120mm exhaust fan in our Cooler Master Centurion 5 CAC-T05-WW case. We ended up having to cut a notch out of the fan housing to give the Karajan enough clearance to fit in the case. While we had the fan removed from the case, we also installed rubber vibration dampeners to prevent the fan from making direct contact with the enclosure.

We later encountered a second problem related to the Cooler Master Centurion 5, specifically with the case's custom drive mounts, which don't require the use of any tools. You just install a drive into any available bay, slide the locking device to the locked position, and the drive is secured firmly in place. These locking devices worked great for our optical drive, but our Vantec NXP-205-BK fan controller panel and Zalman ZM-2HC2 NP hard drive cooler weren't entirely secure. Luckily, we were able to forcefully remove the locking devices from two bays using a pair of pliers and a little elbow grease to reveal standard screw-hole positions lurking beneath them that we could use.


Our Radeon X800 XL looks much more menacing with the Arctic Cooling AVC-AT5 installed. The AVC-AT5 will cool the GPU more efficiently than the stock cooler, plus expel warm air from the system.



With the Zalman ZM-2HC2 NP installed on our hard drive, we had to mount the drive in a 5.25-inch bay.

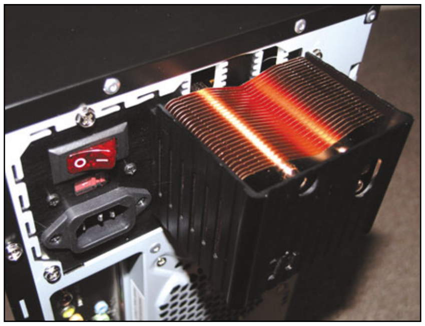
The next three mods that we performed were expected. As we mentioned last month, we planned to replace our Sapphire Radeon X800 XL's stock GPU cooler with a more powerful and quieter product from Arctic Cooling. To install our Arctic Cooling AVC-AT5 Rev. 2 72mm Ceramic VGA Cooler onto the Radeon X800 XL, we had to remove a handful of screws from the back side of the card and unplug the fan in order to uninstall the stock cooler. Then, with the stock GPU cooler removed, we thoroughly cleaned the GPU and RAM chips on the card with some isopropyl alcohol and a lint-free cloth. After cleaning off the stock goop, we put a smooth, thin layer of Arctic Silver 5 on the GPU and prepared the AVC-AT5 for installation by removing a few protective plastic backers installed on the AVC-AT5's thermal pads. These pads act as a thermal-interface material between the RAM and heatsinks.

We then only needed to slide the AVC-AT5 in place, connect its fan to the stock header on the card, and secure the entire unit in place with the unit's included screws. When the mod was complete, our Radeon X800 XL looked nothing like it did when it left Sapphire's plant. With the Arctic Cooling AVC-AT5 installed, both sides of the card were equipped with an oversized heatsink and heatplate, and the card was no longer a single-slot design. Sacrificing a slot for the oversized, quiet GPU cooler will be a huge plus, however, as the cooler will help expel warm air out of the rear of the system and keep heat that the video card generates from building up in the case.

Before installing our ThermalTake Fanless-103 passive cooler onto our CPU, we had to modify the motherboard slightly to accommodate the cooler's unique mounting hardware. Included with the Fanless-103 was a plastic mounting bracket that we had to install on our LANParty NF4 SLI-DR in lieu of a standard Socket 939 bracket. This was an extremely simple process that only required removing a pair of screws to uninstall the standard bracket. We could then install the Fanless-103's bracket in the standard bracket's place using the stock screws.

The Final Assembly

The rest of the build didn't require any major modifications, but we did have to take a handful of extra steps to install a few of the complimentary components in the system. For example, we had to mount the Zalman ZM-2HC2 NP hard drive cooler to our Seagate hard drive using included screws and rubber grommets. With the Zalman ZM-2HC2 NP installed, the hard drive would no longer fit into an internal 3.5-inch drive bay, so we had to place it into a free 5.25-inch bay.



The heatsink on ThermalTake's Silent PurePower PSU protrudes from the system's back to expose the heatsink's fins to cool air.

Our ThermalTake Silent PurePower W0029 ATX 350W power supply didn't require any modifications for installation, as it fit into the Centurion 5 CAC-T05-WW without any problems. However, this isn't exactly a standard power supply. The Silent PurePower W0029 has a group of copper heatsink fins that protrude a few inches from the rear of the system. The PSU is designed this way so that the relatively cool air that circulates through a room (in comparison to the warm air that within the typical computer system) passes over the heatsink's fins, which in turn keep the PSU's internal components running within an acceptable temperature range.

The rest of "Silent But Deadly's" components went together just like any other DIY PC build. We did take the time necessary to clean up all the system's internal cabling to ensure maximum, unobstructed airflow throughout the case, however. To improve system performance, this is something we recommend everyone do, whether the PC is new or not. (We detailed such steps in December 2004's *CPU* on page 30.)

The Completed Project

With "Silent But Deadly" completely assembled, the moment of truth had arrived: Would the system be nearly silent, yet still powerful? After powering the system up, we're happy to report that "Silent But Deadly" is an unmitigated success. With the case fans throttled down to the lowest possible level, "Silent But Deadly" was so quiet that if not for the lighted Vantec NXP-205-BK fan controller panel and power LED on the case, we wouldn't have even known the system was powered up. We actually had to place our ears within a few inches of the rear of the system to hear any noise coming from it at all. Even with the case fans running at their maximum speed, "Silent But Deadly" was so quiet it wouldn't register on our sound level meter.

In addition, "Silent But Deadly" proved to be a decent performer and competent overclocker. We were able to push the system's AMD Athlon 64 3800+ CPU to almost 2.6GHz without encountering any stability issues, and because we installed a beefed-up cooler on our video card, we were able to overclock it quite a bit, as well. However, because our Athlon 64 3800+ and power supply were passively cooled, "Silent But Deadly" ran a bit hotter under the collar than we would have liked. In the end, though, the system ran perfectly, and after spending some time surfing and gaming on this baby, it will be hard going back to using a noisy PC. CPU

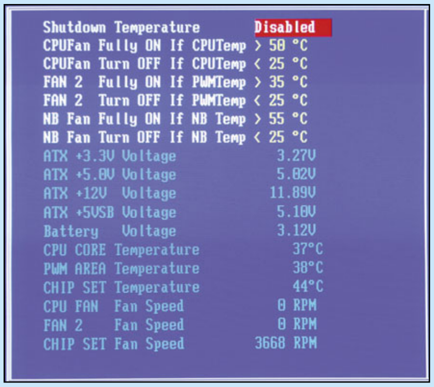
by Marco Chiappetta

"Silent But Deadly" in all its glory. Behold our gorgeous, silent PC.

Our PC Is Silent, But Can It Perform?

We had specific goals in mind before we started building "Silent But Deadly," namely making it as silent as possible but still able to perform powerfully. To assess its performance, we had to consider its capabilities in a few different categories. First, "Silent But Deadly" had to be fast, so we used a variety of standard benchmarks to tell us if we achieved that goal. Second, the rig had to be overclockable without overheating. A quick trip into "Silent But Deadly's" BIOS and a few hours running Folding@Home would tell us how high the system would overclock. Last, but certainly not least, this system had to be quiet. Our trusty sound-level meter would fill us in on how much noise the system emitted.

Overall, we couldn't be more pleased with the results. "Silent But Deadly" proved an excellent performer in every category—relatively speaking. The PC is plenty fast for today's applications and games, is a decent overclocker, and is almost completely silent. In fact, the system is so quiet our sound-level meter wasn't capable of measuring the amount of noise the system emitted from two feet away. The meter could only register noise levels over 40db, so "Silent But Deadly" came in well below that mark. The only area where the system didn't fare very well was in regard to the processor's operating temperatures, which were somewhat high for a Rev. E "Venice" core-based CPU. But higher temperatures are expected considering that we used a passive CPU cooler and very few fans.



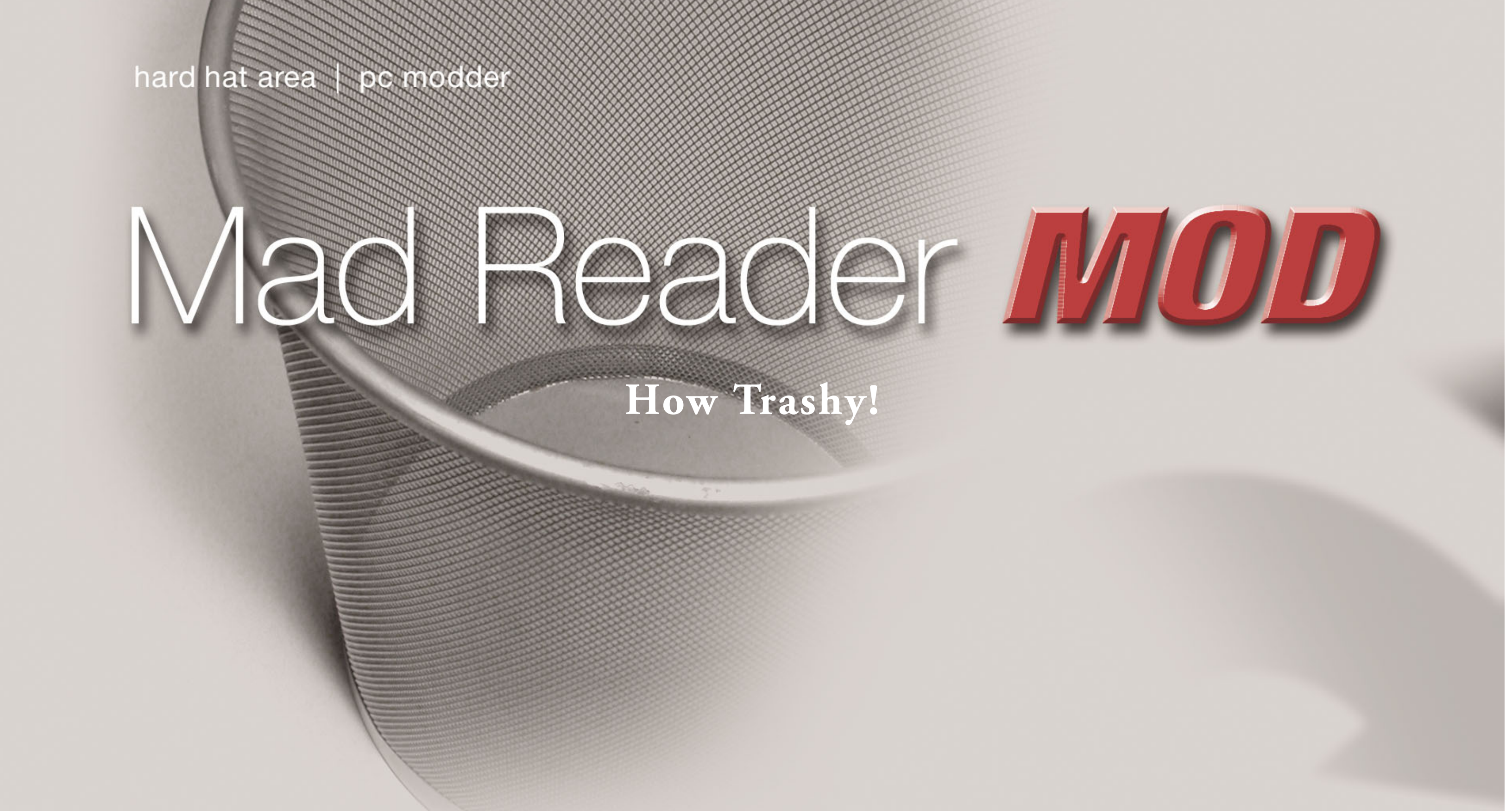
```
Shutdown Temperature          Disabled
CPUFan Fully ON If CPUTemp > 50 °C
CPUFan Turn OFF If CPUTemp < 25 °C
FAN 2  Fully ON If PWMTemp > 35 °C
FAN 2  Turn OFF If PWMTemp < 25 °C
NB Fan Fully ON If NB Temp > 55 °C
NB Fan Turn OFF If NB Temp < 25 °C
ATX +3.3V Voltage               3.27V
ATX +5.0V Voltage               5.02V
ATX +12V  Voltage              11.89V
ATX +5VSB Voltage               5.10V
Battery   Voltage               3.12V
CPU CORE Temperature              37°C
PWM AREA Temperature              38°C
CHIP SET Temperature              44°C
CPU FAN  Fan Speed              0 RPM
FAN 2    Fan Speed              0 RPM
CHIP SET Fan Speed           3668 RPM
```

Our Rev. E Athlon 64 3800+ idled at a relatively high 98.6 degrees Fahrenheit while running at its stock 2.4GHz. With an active cooler installed, the CPU idled at a much more comfortable 86 degrees F.

	Performance At Default Speeds*	Performance At Overclocked Speeds**
PCMark04 CPU	4544	4763
3DMark05 CPU Test	4919	5152
3DMark05 Default Test	5111	5346
Doom 3 (640 x 480)	162.4fps	173.5fps
Doom 3 (1,600 x 1,200)	63.2fps	67.4fps
Temperatures	Idle: 98.6 degrees Fahrenheit/Load: 114.8 degrees	Idle: 102.2 degrees/Load: 129.2 degrees

* CPU: 2,400MHz; Radeon X800 XL: 400MHz core/490MHz memory

"** CPU: 2,580MHz (180MHz overclock); Radeon X800 XL: 450MHz core/560MHz memory (50MHz core overclock/70MHz memory overclock)"



Mad Reader MOD

How Trashy!

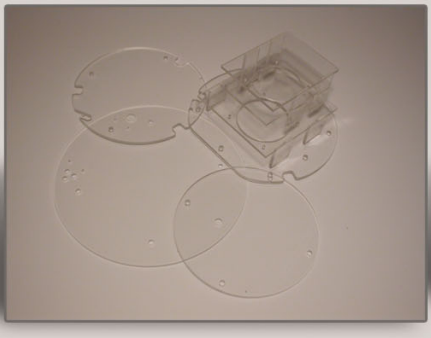
Although nonmodder types often argue the virtues of putting a computer under the desk instead of on top of it, we have never seen a mod purposely created for floor dwelling—until now. Enter the R.Y.C. (Recycle Your Computer), which sits comfortably in an IKEA steel trash can. Alexey "BeWize" Chistov, an 18-year-old student at the Moscow Aviation Institute in Russia, owes the idea for this mod to his friend, Daniil "Y@m@k@si" Horvatovich.

So why toss your computer in the trash anyway? "There was no purpose," says Chistov. "We just decided that it was a great idea and it would look great. It sounded like a great custom case which would look extremely stylish and hi-tech."

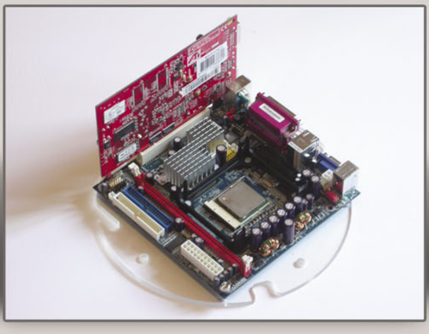
The garbage can is wider at the top than at the bottom, so Chistov designed a five-tiered interior that consists of acrylic plates and steel rods. The rods support each plate and secure the system to the bottom of the can. The lowest (and smallest) plate houses the power supply, while the second plate supports an Insight P4-ITX Mini-ITX motherboard. A hole in the third plate from the bottom lets a fan force air into the CPU heatsink's fins. The optical drive and a hard drive sit on small shelves near the top of the system. Thanks to the acrylic shelves, the drives sit at the edge of the trash can. Chistov cut openings into the can with clippers and used custom-cut plates to create a polished look.

Chistov wrapped up the system by adding a top plate that bears a recycling logo and a small vacuum florescent display. Overall, Chistov is pleased with the finished product, ranking it among his best mods, but he says he learned some things along the way. "I can now say that it could be made much better," he says. ▲

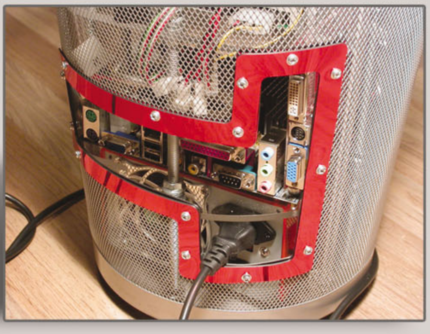
by Joshua Gulick



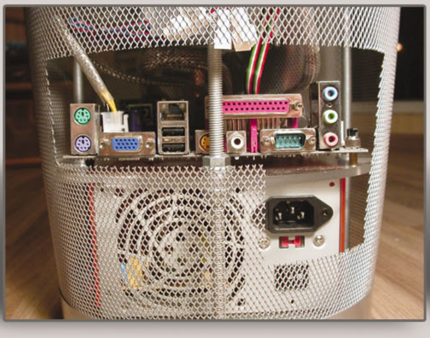
Alexey Chistov drew a diagram of his R.Y.C. mod first and then commissioned custom acrylic cuts. He glued the shelf pieces to create the optical and hard drive bays.



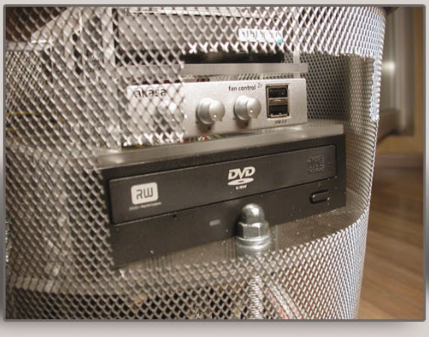
Steel rods run through each acrylic plate, so Chistov needed a board small enough to fit between them. The Mini-ITX board fits, but barely. He angled the motherboard so that its corners stand between the rods.



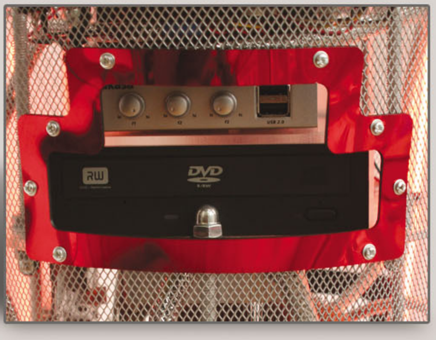
Note that the bottom of the garbage can stands a little above ground, thanks to the bolts at the ends of the rods. You can twist the bolts to level the rig.



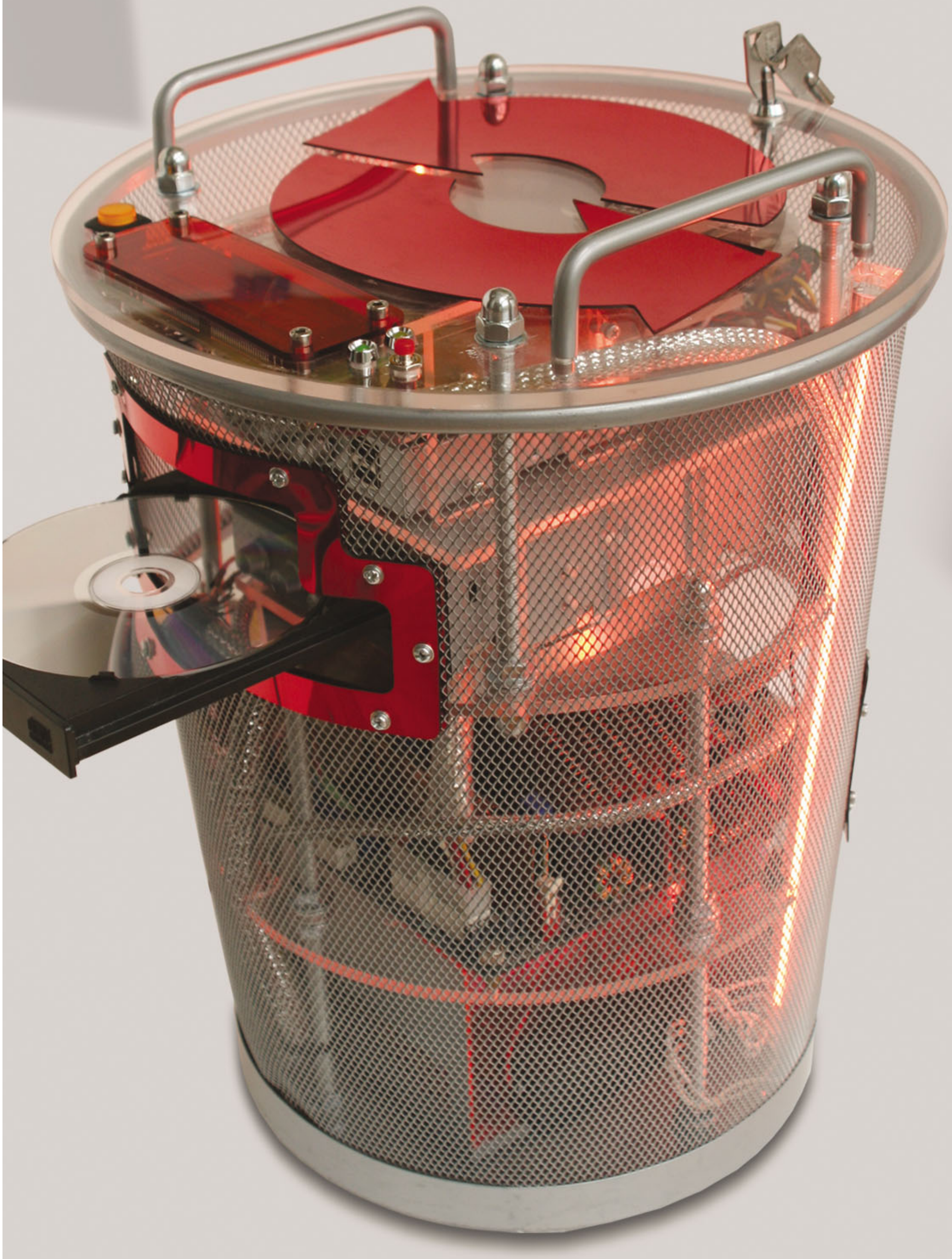
Chistov took this photo before he put the red plate onto the back window. The power supply has an orange acrylic cover that meshes with the system's red lighting.

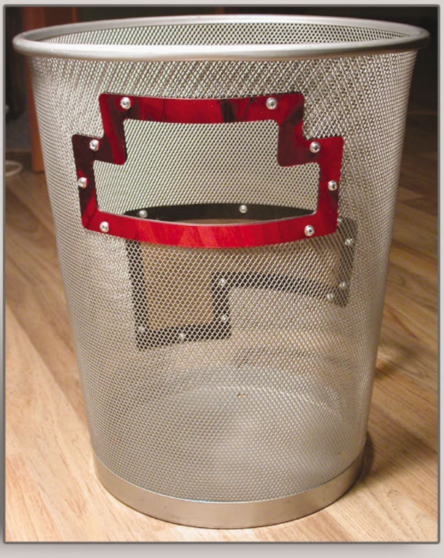


Thanks to the top shelf, the rods don't run all the way to the top of R.Y.C.



The red faceplate turns an otherwise messy cutout into a slick double bay. Note the bolt that secures the anchor rod; it's almost tall enough to block the optical drive.





"At first, I created the plexi levels," Chistov says. "After that, I cut out the sides and designed the red plates. It was pretty easy."

Give Us Your MOD

Have a computer mod that will bring tears to our eyes? Email photos and a description to madreadermod@cpumag.com. If we include your system in our "Mad Reader Mod" section, we'll send you a $1,500 Newegg.com gift certificate and a one-year subscription to *CPU*.

advanced Q&A corner

Get informed answers to your advanced technical questions from *CPU*. Send your questions along with a phone and/or fax number, so we can call you if necessary, to q&a@cpumag.com. Please include all pertinent system information.

Each month we dig deep into the mailbag here at CPU *in an effort to answer your most pressing technical questions. Want some advice on your next purchase or upgrade? Have a ghost in your machine? Are BSODs making your life miserable?* CPU*'s "Advanced Q&A Corner" is here for you.*

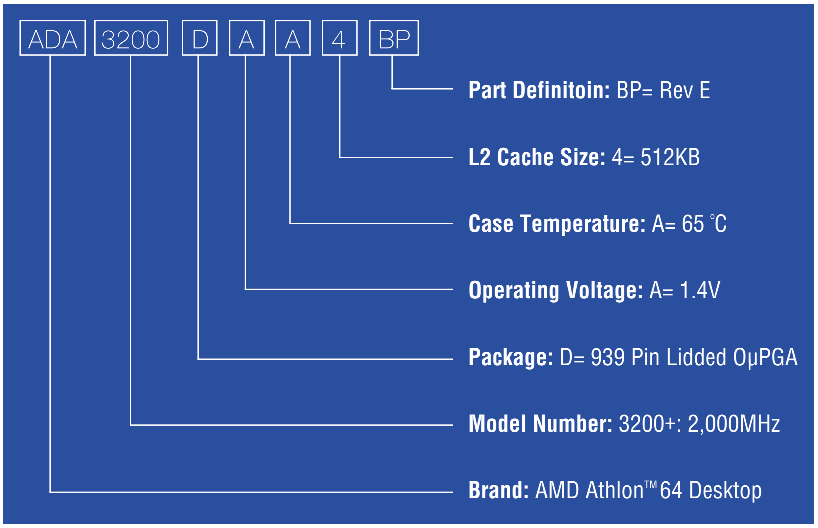
George D. asked: I wanted to get your suggestions on building a strictly nongaming PC. I do most of my gaming on game consoles. I use my PC for email, Web browsing, listening to music, burning CDs and DVDs, and doing some picture and video editing. I'm looking to build a new SFF PC, so obviously I would like it to be small, quiet, and cool, but I also want it to be ready for tomorrow's new OSes and applications.

How would you rate the importance of different components (CPU, FSB, memory, graphics card, power supply, etc.) for such a system? Could you give any specific suggestions for the case, motherboard, CPU, and the graphics card? Thanks in advance! Keep up the great work!

Shuttle's SN25P XPC SFF system is based on the NVIDIA nForce 4 Ultra chipset.

> "You actually can tell what type of processor you're purchasing just by looking at it."

A: We're going to save you a whole lot of trouble, George. From the sound of your email, it seems like you're planning to actually build your own SFF PC using individual components. Although this may be a good idea for some folks, namely those who plan to mod a system or otherwise customize it for a specialized purpose, in your situation we'd suggest purchasing a complete barebones SFF PC from a reputable company such as Shuttle, AOpen, or Soltek. You'll save yourself some money and avoid a multitude of potential pitfalls along the way because these systems already include a case, motherboard, and power supply, along with a host of custom components such as silent heatpipe CPU coolers and removable drive trays. Plus, some barebones SFF systems come prewired from the factory, which makes installation a snap.


ADA
3200
D
A
A
4
BP
Part Definitoin: BP= Rev E
L2 Cache Size: 4= 512KB
Case Temperature: A= 65 °C
Operating Voltage: A= 1.4V
Package: D= 939 Pin Lidded OµPGA
Model Number: 3200+: 2,000MHz
Brand: AMD Athlon™64 Desktop

All of those numbers etched into the top of a processor actually mean something. Deciphering the codes will give you a plethora of information.

To get to the meat of your questions, we'd say that the amount of memory you purchase is most important, followed by the video card, and then the CPU. But we'd also say that the size/speed of your hard drive and your choice of optical drive are important, as well. To build a semipowerful SFF system that's going to be ready for next-gen OSes, you're going to need a lot of memory, plenty of storage, a DX9-class video card with at least 128MB of onboard RAM (not shared), a sufficiently fast processor, and a means of backing up your data. We think an SFF system, such as Shuttle's SN25P XPC, would be a perfect match. The SN25P is based on NVIDIA's nForce 4 Ultra chipset and supports all Socket 939 AMD Athlon 64/FX processors. It has good integrated sound, courtesy of a VIA Envy24PT audio controller, Gigabit Ethernet with ActiveArmor, and support for PCI Express and both IDE and SATA RAID. It also has internal bays that accommodate three 3.5-inch hard drives, along with an optical and floppy drive and an 8-in-1 card reader. The SN25P also has plenty of USB 2.0 and FireWire ports available and a beefy 350W power supply. In addition, the SN25P XPC is quiet in most circumstances, thanks to an intelligently designed multi-zone chassis, smart fan controls, and a custom CPU cooling system.

To complement the SN25P, we'd recommend at least 1GB of low-latency PC3200 RAM, preferably from Corsair or Kingston. To get all of the graphical goodness from next-gen user interfaces, you're going to want a DirectX 9-class video card with a discrete frame buffer, and the GeForce 6600 is a perfect match for the nForce 4 Ultra chipset found in the SN25P. There are even some passively cooled 6600s available that will keep the system running quietly. On top of those components, a relatively fast CPU, such as an Athlon 64 3500+ or faster, would be fine. Also, a large SATA hard drive with NCQ should be a prerequisite. Maxtor's MaxLine III of 7,200rpm hard drives, which come with 16MB caches and have NCQ support, would be a good choice. We'd recommend at least a 250GB drive. Lastly, you're going to need a way to back up data. A good optical drive should fit the bill, and a dual-layer DVD burner would be the best choice. High-quality dual-layer DVD burners are available from numerous manufacturers, but we're partial to the Plextor, Sony, and Lite-On brands.

Bill C. asked: **I've been reading a lot of information about AMD's new Venice core and want to buy one for a new system I plan to build. The problem is, I've got a gift certificate to a local mom-and-pop computer store here in town, and they haven't got a clue as to what I'm talking about. They have most of the parts I want to buy in stock, but I want to be sure that the processor I take home is based on the Venice core because I plan to overclock. How can I be sure that the processor this store sells me is the right one? Is there any way to tell just by looking at the CPU?**

A: You actually can tell what type of processor you're purchasing just by looking at it. There are codes etched into an Athlon 64's integrated heat spreader that can help you figure out information about the processor. To ensure that you get the right CPU, ask the associates at your local shop to show you the processor. Pay attention to the four lines of numbers and text etched onto the IHS just under the processor branding. The first line reads AMD Athlon 64, and the second line says something such as ADA3800DAA4BP. The second line will reveal whether you're buying a new processor based on the Venice core. Note that processors based on the Venice core are also known as Rev E Athlon 64s.

For more info, on AMD's Web site (www.amd.com/us-en/assets/content_type/white_papers_and_tech_docs/30430.pdf) you'll find a PDF titled, "AMD Athlon 64 Processor Power and Thermal Data Sheet." In this document AMD explains what the codes on the top of its Athlon 64 processors mean (although at press time it wasn't updated with information about the Venice core). The first three letters, ADA, designate the processor brand; in our case it's an Athlon 64. (FX processors are labeled ADAFX.) The next four digits are obviously the model number. The next letter, D, indicates what packaging the processor uses. The D indicates it's a Socket 939 chip. If there was an A, it would mean it's a Socket 754 processor. The next letter is the operating voltage (the A in our example means 1.4V). The next letter, A, designates the maximum case temperature, which ranges from 145.4 to 158 degrees Fahrenheit (63 to 70 degrees Celsius) depending on the core used. But it's the last two characters in the code that will tell you definitively whether you're getting a Venice core-based CPU. The BP in our example tells us that our processor is a Venice core. If those last two characters were AS, it would mean it's a Clawhammer, BI would designate a Winchester, and BN would indicate a San Diego core. There are many other designations, as well, so make sure you check out the data sheet on AMD's site. Ultimately, make sure the processor you buy has BP at the end of the code and you should be fine. ▲

by Dave Altavilla and Marco Chiappetta,
the experts over at HotHardware.com

For bonus content, subscribers can go to
www.cpumag.com/cpusept05/q&a

Filter Cubicle Distractions

How To Concentrate In Your Cube

Computers and technology typically receive the blame for causing distractions in the workplace. After all, people have a limited amount of attention they can devote to a particular project. Technological interruptions don't seem to care about our limited attention spans. Each piece of technological hardware you add to your collection seems to bring a new type of interruption.

Technology That Will Help You Focus

Researchers at Queen's University in Ontario and at Carnegie Mellon University in Pittsburgh are attempting to create a new reputation for technology as something that helps workers improve their focus and concentration.

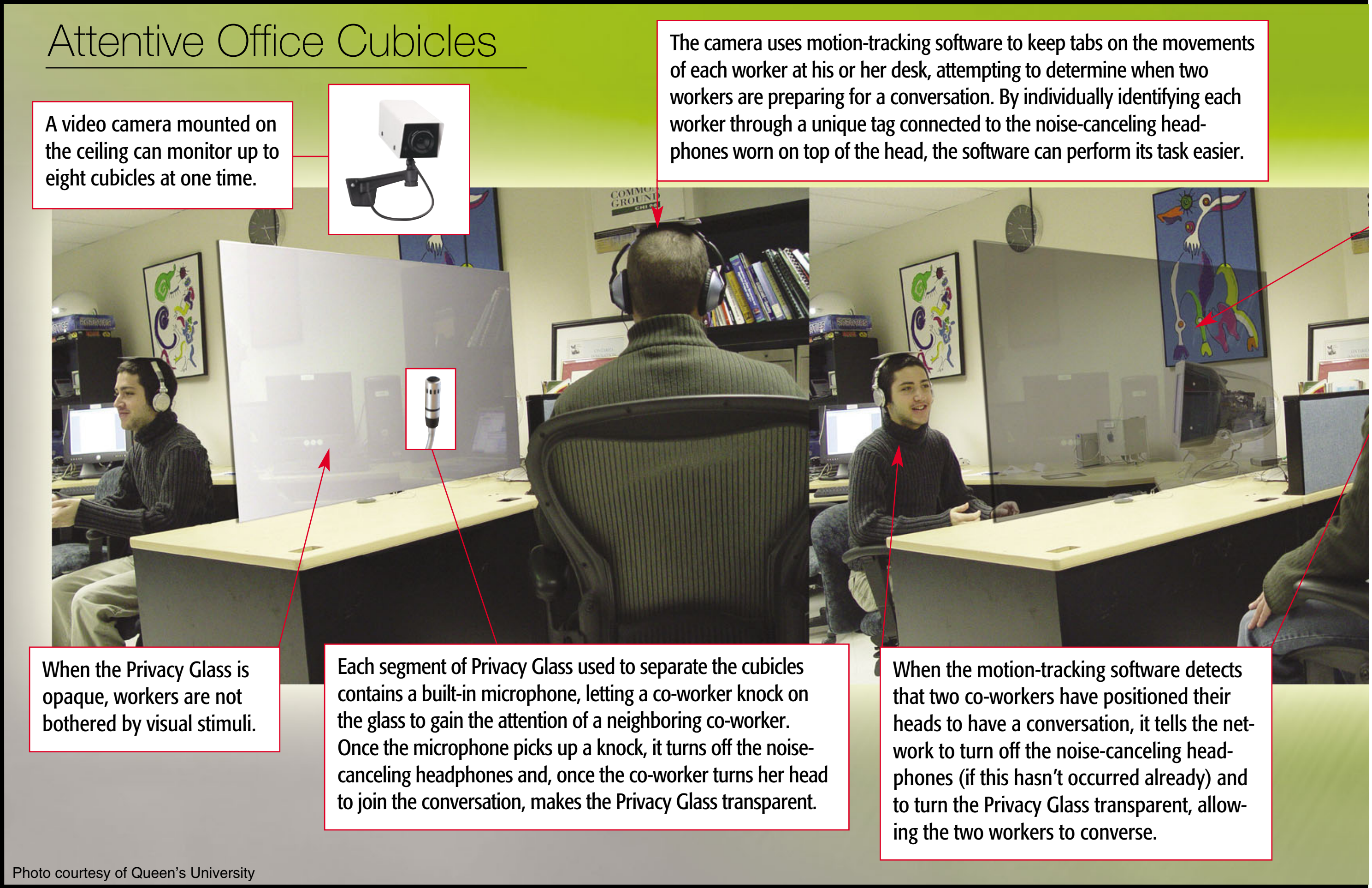
The Attentive Office Cubicle uses software, motion-tracking hardware, liquid crystals embedded in glass, and special headphones to filter unwanted distractions in the workplace. It's specifically designed for offices that resemble "cubicle farms," which generate a lot of audible and visual distractions.

Eventually through this research, computers could become sociable systems that could measure and interpret the visual cues that humans use in normal conversations.

Reduce Distractions

To make such an idea a workable reality, computing systems need three easily defined, but not easily implemented, skill sets.

Sensing. Before it knows whether an interruption is OK, the system must sense what a person is doing. The system must be able to sense the difference between a person frantically sorting papers on a desk vs. relaxing and reading a newspaper.



Attentive Office Cubicles

A video camera mounted on the ceiling can monitor up to eight cubicles at one time.

The camera uses motion-tracking software to keep tabs on the movements of each worker at his or her desk, attempting to determine when two workers are preparing for a conversation. By individually identifying each worker through a unique tag connected to the noise-canceling headphones worn on top of the head, the software can perform its task easier.

When the Privacy Glass is opaque, workers are not bothered by visual stimuli.

Each segment of Privacy Glass used to separate the cubicles contains a built-in microphone, letting a co-worker knock on the glass to gain the attention of a neighboring co-worker. Once the microphone picks up a knock, it turns off the noise-canceling headphones and, once the co-worker turns her head to join the conversation, makes the Privacy Glass transparent.

When the motion-tracking software detects that two co-workers have positioned their heads to have a conversation, it tells the network to turn off the noise-canceling headphones (if this hasn't occurred already) and to turn the Privacy Glass transparent, allowing the two workers to converse.

Photo courtesy of Queen's University

Reasoning. With knowledge of the situation available, the system then must determine whether the reason for the interruption would be more important than the person's current task.

Communicating. Finally, the system must determine the best way to communicate the message. Perhaps the system could provide a muted tone for a message that isn't urgent and a loud audio interruption for a vital message.

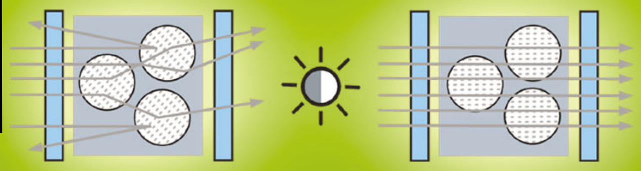
By improving a person's ability to perform a task with fewer distractions, researchers think this will be a step toward letting the brain work more efficiently. By using technology to cancel distractions, researchers hope not only to help employees be more attentive in busy office settings, but also to potentially help adults and children who suffer from attention disorders.

by Kyle Schurman

Decrease Distractions Of Mundane Tasks

Distractions don't only come from stray noise and a bombardment of audible and visual cues; employees also lose the ability to focus on idea generation because of the need to complete mundane tasks. For example, searching a hard drive for a particular file or being tied to a computer terminal waiting for some information to arrive can limit an employee's ability to be creative and productive with his time.

Researchers at Carnegie Mellon are developing a project, called Aura, that will help reduce the distraction of performing such mundane tasks. This system automates many tasks, giving employees more time to perform their jobs. The computer system alerts workers to important messages, performs file searches automatically, and automatically identifies them when they sit down at any of the dozens of workstations in an office building (giving them flexibility in where they work). For more information on Aura, go to www-2.cs.cmu.edu/~aura. ▲



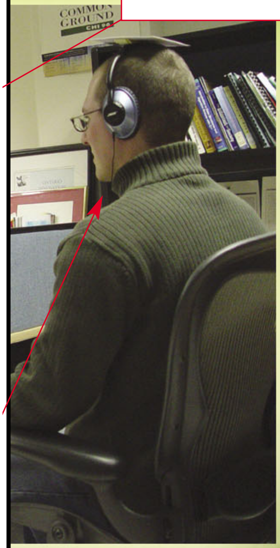
Privacy Glass

Privacy glass consists of a liquid crystal sheet sandwiched between two panes of glass. When the Privacy Glass is turned off, the molecules in the liquid crystal sheet take on a random arrangement, causing them to disperse the light waves coming through. This makes the glass opaque or translucent.

When Privacy Glass is turned on and voltage is applied to the liquid crystal sheet, the molecules align themselves in the same direction, letting light waves pass through the glass, making the glass transparent. ▲

Source: SwitchLite

When they need to make visual contact with a co-worker, the Privacy Glass turns transparent.



Each set of noise-canceling headphones also is equipped with a microphone, giving the system another clue for determining whether a legitimate conversation is taking place. The user can manually turn on and off the noise-canceling headphones. With the headphones turned off, the wearer hears all sounds normally. With the headphones turned on, the noise around the wearer is reduced by 20dB, reducing stray noise and audible distractions.

As an added benefit, the computer can store and run speech recognition on any conversation that takes place, letting users pause an audio stream or listen to two conversations at the same time. The system also can use speech recognition technology to run automatic searches using Google as the conversation takes place. ▲

When the Attentive Office Cubicle system senses that the co-workers in neighboring cubicles are not conversing with each other, it changes the configuration of the cubicle.

The cubicle glass between the co-workers changes from transparent to opaque, reducing the visual interruptions and distractions that could be occurring in the co-worker's cubicle. If the system senses that noise from the adjacent cubicle is a distraction, it uses noise-canceling headphones to reduce interruptions.

When a co-worker is ready to interact, the cubicle senses that the conversation and visual cues are aimed at the person in the other cubicle. It then returns the glass between the co-workers to transparent and turns off the noise-canceling headphones, letting normal visual and audio cues commence.

Source: Queen's University (Kingston, Ontario)

Focused Audio

Brings Sound To You & Only You

Improved focus is almost always a good thing. For one, when you give a project complete mental focus, it usually means more success. When your camera's focus is working well, it gives you top-of-the-line photos. Additionally, the harnessing of focused light, laser light, has led to the creation of several incredible technologies.

Focused Audio

So what about focused audio? Researchers have been working on such a technology for several years now, and we're beginning to see products enter the consumer, industrial, and military arenas.

Two companies have developed competing focused audio products. The better-known product is HSS (HyperSonic Sound) from ATC (American Technology Corporation; www.atcsd.com) and the mind of Elwood "Woody" Norris (see our interview with Woody in last month's issue of *CPU* on page 103). Conversely, Holosonic Research Labs (www.holosonics.com) has created a product called the Audio Spotlight sound system. Both technologies give companies the ability to focus sound at one individual while nearby people hear nothing.

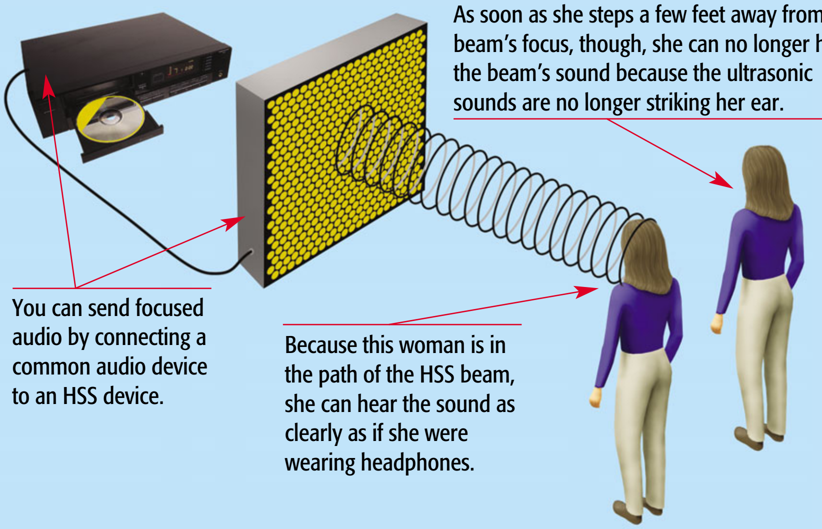
HSS

Norris has had a hand in inventing many devices, including playing a major role in development of the technology behind sonograms in the 1960s. He recently invented a personalized helicopter that Norris says could eventually become as commonplace as ATVs. In April, Norris won a $500,000 Lemelson-MIT Prize for

Basics Of HSS

To visualize how sound emits from a traditional speaker, think about how ripples radiate from a pebble tossed into a puddle. Just as with the pebble, the sound waves move in every direction away from the traditional speaker. With focused audio, such as HSS (HyperSonic Sound), though, the sound waves move in a specific direction on a narrow beam. Consequently, this lets the person holding an HSS device aim the beam at a person or object, making it appear as though the sound is originating from the place where the beam strikes first, whether it's a wall or a human's ear.

Because the wavelengths of the ultrasonic sound waves are very small, they can hold their narrow beam until they strike an object (in this case, a person's ear). They then degrade, letting the person in the path of the beam hear the sound. ▲



As soon as she steps a few feet away from the beam's focus, though, she can no longer hear the beam's sound because the ultrasonic sounds are no longer striking her ear.

You can send focused audio by connecting a common audio device to an HSS device.

Because this woman is in the path of the HSS beam, she can hear the sound as clearly as if she were wearing headphones.

HSS uses a transducer instead of speaker cones. The device is about the size and thickness of a large dinner plate. The transducer for HSS is a 28-micron piezoelectric PVDF (polyvinylidene fluoride) film. PVDF film is a specially treated plastic film that produces sound vibration when exposed to an electrical field. This sound vibration, also called a flutter, creates the ultrasonic sound waves.

Sources: American Technology Corporation, USA Today his inventions, including HSS, which is highly regarded in the scientific community. *Popular Science* even awarded HSS its grand prize for inventions in 2002.

Ultimately, Norris was able to succeed with focused audio where others had failed. The idea for focused audio has been around for decades, but other inventors were unable to create a device that could be cost effective and practical to use.

Holosonic Research

Joseph Pompei started working in the audio industry for Bose when he was 16 years old. He created the Audio Spotlight while working at the MIT Media Lab. Pompei later founded Holosonic to commercialize the idea.

Both Pompei and Norris have filed dozens of patents on their ideas. Both technologies are built on the same basic

Make Focused Audio Waves Work

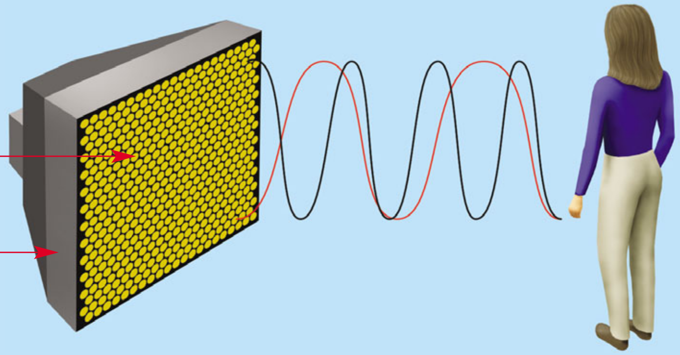
Focused audio devices, such as HSS, generate sound waves in a narrow beam, much like laser light. The wavelengths from ultrasonic sound are usually only a few millimeters, which lets them travel in a narrow, focused beam.

Inventor Woody Norris says he began considering the idea behind HSS in the mid-1970s after studying the way color TV works by blending red, green, and blue light to create the TV picture. He thought that by blending two types of sound waves, he would be able to create other kinds of sound. Knowing that ultrasonic sound waves can travel over longer distances than sound waves at lower pitches, Norris figured out a way to have two different ultrasonic waves carry information about a sound. As the waves strike a solid object, such as a person's ear, they distort by slowing and crashing into each other. This collision causes them to re-create the original sound in the air around the object. That's why you don't hear anything when you step out of the beam of focused audio; without anything to crash into, the ultrasonic waves continue traveling without any degradation. That's also why sound waves from HSS technology could appear as if they're coming from whatever they hit first, rather than the HSS speaker. Aim the HSS speaker at a wall, and the sound will seem to come from the wall.

When two sound waves are created simultaneously, they combine to create two new frequencies: One that's a difference between the frequencies of the original waves, and one that's a combination of the frequencies.

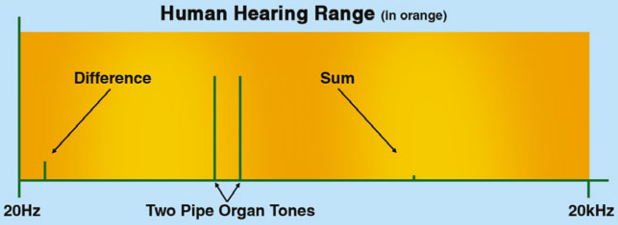
Hermann von Helmholtz, a German physicist, discovered this phenomenon 150 years ago, which occurs because air is nonlinear (as shown in the lower-right chart). By carefully measuring the frequencies generated when playing two notes loudly on a pipe organ, he discovered that four tones actually occurred.

When using ultrasonic waves, the combined frequency is beyond the capacity of human hearing. But the frequency that's the difference between the two is within the human hearing range. For example, to create middle C (which has a frequency of 263Hz), you'd send two ultrasonic waves with frequencies of 200,000Hz and 200,263Hz. The combined frequency would be 400,263Hz, well beyond human hearing capabilities. But the difference in frequency would be 263Hz. Obviously, implementing the HSS technology is far more complex than this example shows, but it provides a basic idea of how HSS works. (An example of HSS tones is shown in the lower-right chart.) ▲

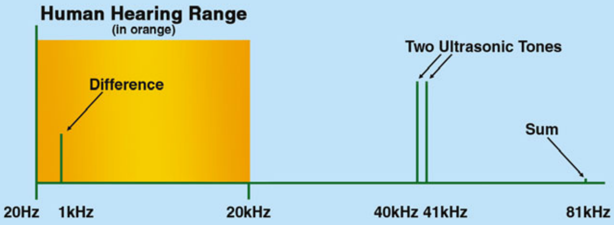


Piezoelectric crystals joined to an acoustical interface

Hypersonic speaker



In this example all four tones are within the human hearing range, all of which occur at different strengths. (Stronger tones are represented by longer vertical lines.)



In this example only one of the four tones is within the human hearing range.

Sources: ATC, WoodyNorris.com

Focused audio devices generate . . .

principle, though, using ultrasonic waves to deliver sounds inside the range of human hearing. Although development of and research on focused audio continues (some problems with the technology include re-creating bass tones and preventing the waves from occasionally bouncing off unintended objects), some products are becoming more mainstream.

Use Focused Audio

The list of potential applications for focused audio is impressive, ranging from convenience to safety-related to advertising-related. Here are a few:

Safety. A lifeguard could use focused audio where audio from a megaphone couldn't reach to warn a swimmer who is too far from shore. The focused audio would carry farther than audio from the lifeguard's voice or from a megaphone.

A police officer could direct commands to individual people, rather than to all bystanders, to disperse a crowd or to move pedestrians more smoothly.

Researchers could focus the noise from a crosswalk signal that helps a blind person know when to cross the street, letting the blind person know when he or she has strayed out of the crosswalk boundaries.

Military. The U.S. military is experimenting with using focused audio to disorient and disable enemies. (ATC's product is called HIDA [High Intensity Directed Acoustic].) A powerful blast of audio waves could disorient an individual, causing him to fall to the ground and be rendered helpless, while leaving bystanders unharmed. Individuals who've experienced a version of HIDA designed for the military say, even at low levels, the audio waves are extremely powerful and disarming, causing a variety of temporary health problems including painful, immobilizing headaches. Because HIDA works on the bones in your inner ear, the device would incapacitate even deaf people.

On a busy, noisy deck of an aircraft carrier, personnel often can't hear instructions or warnings from fellow soldiers. Focused audio could come through loud and clear to help prevent accidents.

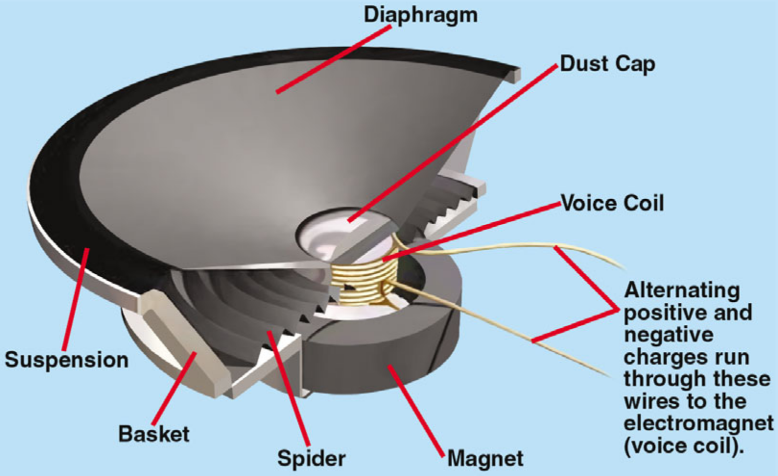
When storming an enemy stronghold, soldiers could fool the enemy into thinking an attack was coming from one direction by bouncing focused audio off an object. The soldiers then could attack from the other direction and catch the enemy by surprise.

Entertainment. A family riding in a car could enjoy individual musical choices without headphones. Focused audio would give each person his or her music choice, and no one could hear the other person's music.

Museum patrons looking for an audio description of a particular exhibit could stand in one spot near the exhibit and receive the information via focused audio. Other patrons who didn't want to hear the audio stream could stand a couple of feet away, but still in front of the exhibit, and not hear any of the audio description.

For gaming, the possibilities are almost endless. Focused audio could give games

How Traditional Speakers Work


Diaphragm
Dust Cap
Voice Coil
Alternating positive and negative charges run through these wires to the electromagnet (voice coil).
Suspension
Basket
Spider
Magnet

Source: HowStuffWorks.com

A basic speaker translates the electrical signals that a CD or other audio source creates into physical vibrations that become sound waves. A speaker rapidly vibrates its diaphragm (or cone) to create the sound waves. A speaker uses many parts to vibrate the diaphragm.

Spider. A flexible ring that attaches the voice coil to the basket, which lets the coil move back and forth.

Voice coil. A coil of wire that acts as an electromagnet. The voice coil, in conjunction with the magnet, creates the vibrations by constantly reversing the polar orientation of the electromagnet. The voice coil is alternately attracted to and repelled from the magnet, causing it to move back and forth rapidly. The voice coil is connected to the diaphragm, and the coil's movements shift the diaphragm.

Basket. The metal frame of the speaker.

Suspension. A flexible rim connected to the cone that lets the cone move. The suspension also is attached to the basket.

. . . sound waves in a narrow beam.

amazing realism. First-person shooters could "hear" sounds occurring around them in the proper position that correlates to the game without the hassle of a multispeaker setup. In multiplayer games, each player could hear game sounds or tips personalized to his situation in the game without any other player hearing.

At a sporting event, a coach could give directions from the sidelines to individual players without the need for in-helmet speakers and without the opponent hearing. Also, a fan could heckle an opposing player and ensure that only the player hears him.

Television viewers could hear a program without bothering anyone else in the room, such as a sleeping spouse.

Advertising. As a customer pauses to consider a product display in a store, a focused audio speaker would give the customer information about the product without disturbing any other shoppers.

In noisy atmospheres, such as a busy city street, a pedestrian walking past a restaurant could clearly hear the daily specials with the focused audio dominating the stray noise.

At a trade show, focused audio could draw people into the trade show booth by overcoming the stray noise in the building and giving passersby the type of information they're seeking.

Did You Hear That?

As with almost any technology, in the wrong hands HSS and focused audio could be dangerous. Beyond the military applications we already described, there are potential problems for everyday life.

Those who've witnessed a first-hand demonstration of HSS say it seems as though the sound is coming from *inside* their heads, even though they know the device generating the sound is 100 yards or more away. Sound creepy? Yeah, it's a little creepy, especially if you *didn't* know the location of the device generating the sound. If an advertiser, or someone else, could speak to you from a city block or more away, that could be unnerving, especially if you didn't know who was speaking to you and why. Without regulations, advertisers might have the ability to bombard you with audio ads anytime, anywhere, and from any direction.

If focused audio technology finds its way into the everyday fabric of life, though, it definitely could change the ramifications of the phrase, "I'm hearing voices inside my head." Such voices may no longer mean you need psychiatric help; instead, they could mean Heinz is asking you directly to pick up a bottle of its new low-carb ketchup, instead of just looking at the display in the store. ▲

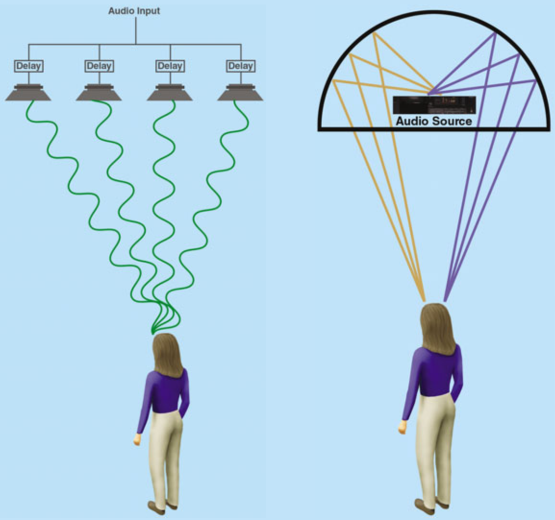
by Kyle Schurman

Other Focused Audio Solutions

Solutions from American Technology Corporation and Holosonic Research aren't the only ideas for delivering focused audio.

Dakota Audio. Dakota Audio's (www.dakotaaudio.com) product, called Focused Sound (left), sends multiple sound waves from multiple speakers to a focused point. If the listener is standing at the point where the speakers are aimed, she will hear a resulting sound that combines all the sound waves. Those people standing away from the focused point will hear a far-lower sound level. To create this focal point using the speakers alone, the speakers would need to be arranged perfectly, each one equidistant from the desired point. Focused Sound lets you place the speakers in any arrangement that's convenient; the product creates delays in the sound waves from certain speakers, letting all of the sound waves converge at the proper time. By further controlling the delays, Focused Sound can change the focal point or make it larger or smaller.

Brown Innovations. Brown Innovations (www.browninnovations.com) makes use of sound domes and a product called Localizer (right) to create focused audio. When the listener is under the dome, she hears the full audio effect. When she steps outside the dome, though, Brown says the audio level drops by 80%. The dome's natural spherical surface reflection allows Brown's technicians to pinpoint the sound to the user located directly under the dome. Brown says the sound seems as if it's coming from headphones. ▲



Sources: Dakota Audio, Brown Innovations

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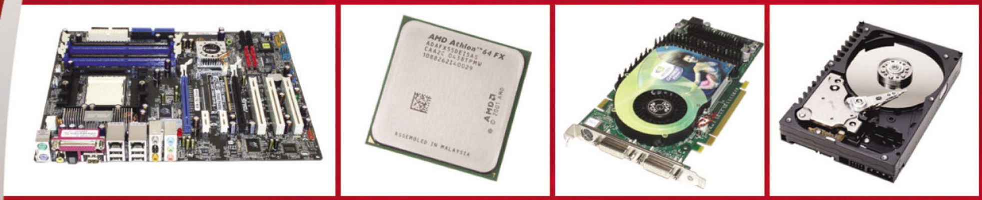

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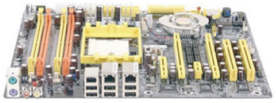

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Mobile Computing Your Way, Right Away

Customize Your Road Rage

Your Notebook, Your Way
When Buying Pre-Built Just Won't Cut It
54

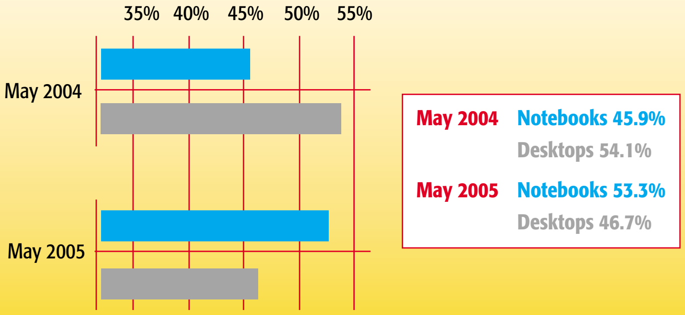
Gear Gone Mobile
Cool Gadgets For The Mobile-Minded
66

Mobile computing is rapidly increasing in popularity. A few years ago, the price/performance ratio of a typical notebook was far worse than most desktop machines. A $1,500 desktop machine could outperform a $2,500 notebook in virtually every performance category. But times have changed. Notebooks now feature specialized low-power processors that are every bit as fast as desktop CPUs, and you can configure them with mobile graphics processors that have the same feature sets as their desktop counterparts. Mobile chipsets are more feature-rich, draw less power, and can support more RAM. Also, the 2.5-inch hard drives notebooks use are faster and available in larger capacities, and now LCD screens are available in a multitude of sizes. Perhaps best of all is that the price of all of these components has dropped exponentially. It's now easy to find a capable notebook for less than $1,200 that performs on-par with a similarly configured desktop machine.

With the demand for mobile computers rising these days, so is the supply of notebooks for buyers to consider. Unlike the notebooks of yesteryear, there are now myriad options available for each model. Here we'll give you a comprehensive look at the current state of mobile computing and the core components that compose a typical notebook.

Notebooks vs. Desktop Computer Sales

Notebooks Outpace Desktop Sales



(Source: Current Analysis)

Mobile CPU Showdown

Virtually all of today's notebooks are powered by processors built by Intel, AMD, or Transmeta. In the same way AMD and Intel duke it out in the desktop space, they constantly try to one up each other in the mobile space, as well. Transmeta's processors, however, have been relegated to low-power niche products, such as OQO's Model 1, and aren't as ubiquitous as Intel's or AMD's products.

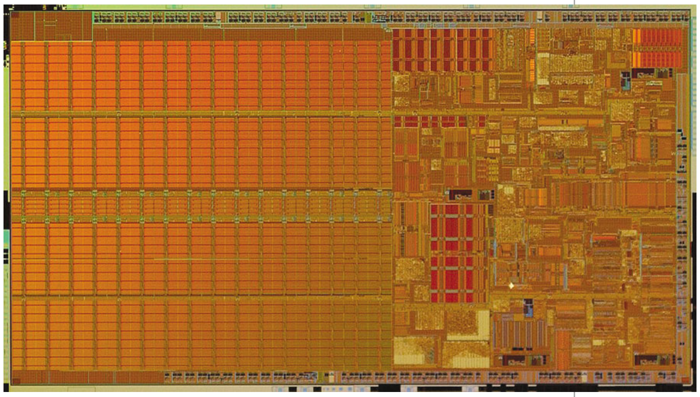
Both Intel and AMD have multiple specialized processor lines available for mobile platforms, and each company's desktop processors are used in some DTR notebooks, as well. But just as the mobile space has been divided into desktop replacement, performance thin, mainstream thin-and-light, and value mainstream segments, so has the type of processor each segment uses.

In the DTR space, the Athlon 64 and Pentium 4 are the most widely used processors, with a portion of the market belonging to high-end Pentium M processors. These DTR notebooks are large and heavy and don't offer much in terms of battery life, but they are high-performance products. Many DTR notebooks are just as powerful as similarly configured full-sized machines, and you could even use them as a desktop replacement.

At the other end of the spectrum, AMD's Mobile Sempron and Intel's Celeron M processors hold the majority of the value mainstream and a portion of the mainstream thin-and-light market. Both the Mobile Sempron and Celeron M processors share much of the same architecture as their higher-powered counterparts, but they tend to have lower clock speeds, slower buses, or less L2 cache. Yet, the recent influx of inexpensive notebooks is due in part to the widespread availability of the Mobile Sempron and Celeron M processors. As of press time, Compaq/HP, Dell, Gateway, and others have sub-$750 notebooks available, and they're all powered by Mobile Sempron or Celeron M

Mobile Processors

Before we begin, let's clear up some of the confusion surrounding Intel's Centrino mobile technology. Centrino is not a processor. A notebook that features Intel's Centrino mobile technology is equipped with a combination of a Pentium M processor, a related chipset, and an Intel 802.11 wireless network controller. So, when you see a Centrino laptop, it's powered by a Pentium M processor.

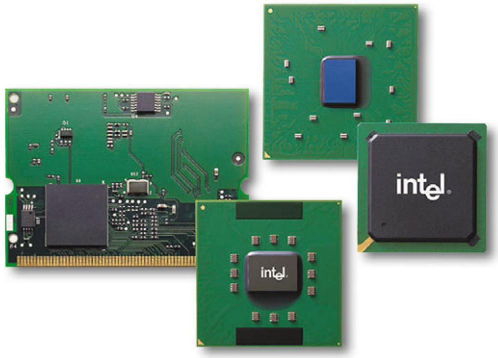

Pentium M processors based on the 90nm Dothan are a key component of Intel's Centrino mobile platform.

Intel has three processor families designed for mobile use: Pentium M, Celeron M, and Mobile Pentium 4. AMD, conversely, has Turion 64, Mobile Athlon 64, and Mobile Sempron. Also, both company's desktop processors are used in some DTR (desktop replacement) and performance notebooks. Mobile processors perform the same functions as desktop CPUs, but they feature power-saving technologies designed to lower power consumption and thermal output while maintaining good overall system performance. Intel's processors feature SpeedStep technology that adjusts clock speed based on load. AMD's processors feature PowerNow and Cool'n' Quiet technology, which act in a similar manner. Both company's mobile processors also require less voltage than desktop chips to operate at their designated frequencies, which further reduces power consumption.

Intel and AMD also have dual-core mobile processors planned, but details are scarce. AMD's desktop dual-core Athlon 64 X2 processors will probably show up in some DTR notebooks soon, but we haven't heard anything definitive yet. Intel, however, has released some details about its first dual-core mobile processor, code-named Yonah. Yonah will be built upon an advanced 65nm process and feature one piece of silicon with two execution cores. Microarchitectural changes on Yonah include an advanced thermal manager, dynamic power coordination for power conservation between the two cores, and Intel Smart Cache for enhancing cache and bus performance for multitasking and multithreaded applications.

Mobile Chipsets

Depending on the processor powering the system, today's notebooks use several mobile chipsets. AMD doesn't make its own mobile chipsets, but works with



Intel has an entire line of low-power mobile chipsets available, each designed for a specific target market.

processors. Thus, users who favor value and battery life over system performance should look to these processors for their mobile computing needs.

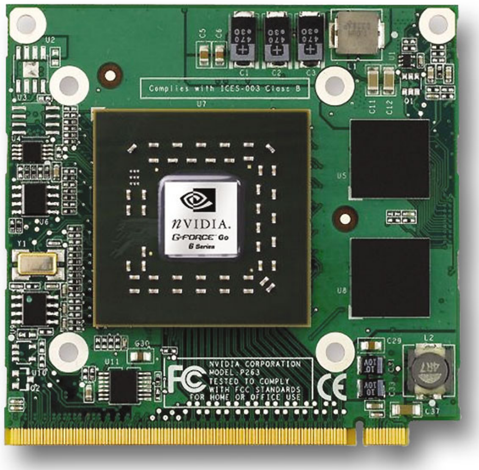
Battling it out in the mainstream market is Intel's Pentium M and AMD's new Turion 64 processor. Also, depending on their clock speeds, you can find these processors in DTR and value notebooks, as well. The original Pentium M processors, based on the 130nm Banias core, were released in 2003. They were well-received because of their low power requirements and relatively high performance. Since then, Intel has released updated Pentium M processors (based on the 90nm Dothan core) with higher bus speeds and double the amount of L2 cache (1MB). Intel has also released new mobile chipsets, the Mobile 9xx family, that support emerging technologies, such as PCI-E, DDR2 memory, and high-definition audio. Notebooks powered by Intel's newer chipsets, such as the Mobile 915PM and Dothan-based Pentium M processors, are revered for their high performance per watt and excellent battery life.

AMD's relatively new Turion 64 processors are designed to do battle with Intel's Pentium M processors and offer similar performance levels per watt. Turion 64 processors are essentially low-power versions of the 754-pin Athlon 64 and, as such, they offer many of the same benefits, such as HyperTransport technology and the ability to run 32- and 64-bit applications, when using the appropriate OS.

Pentium M and Turion 64 processors are ideal for mobile platforms because they feature technologies specifically designed for mobile use. For example, they require less voltage than most desktop processors, and you can dynamically adjust their clock speeds based on load and disable portions of the chip when not in use. The aggregate affect of these technologies is a processor that generates less heat, requires less power, and runs for a longer period of time on a single battery charge. ▲

partners such as ATI, NVIDIA, SiS, and VIA, among others. The mobile chipsets AMD-powered notebooks use are essentially the same as their desktop counterparts, but they have been tweaked for low-power operation.

Intel, though, has a stranglehold on the mobile chipsets its Pentium M and Mobile Pentium 4 processors use. Intel currently has two main mobile chipset families: Mobile 9xx and 8xx chipsets. The Mobile Intel 9xx chipset is a component of Intel's Centrino mobile technology. It offers support for high-definition audio, up to 2GB of DDR2 memory, and PCI Express. The older Intel 8xx chipset family is also a part of Intel's Centrino mobile technology, but the Mobile 8xx chipset supports DDR1 memory and has an AGP 4X interface to provide support for discrete graphics solutions.



NVIDIA's MXM (Mobile PCI Express Modules) could usher in an era of widespread user-upgradeable mobile graphics cards.

Graphics On The Go

As you may expect, the mobile graphics space is dominated by ATI, NVIDIA, and Intel. Notebook users don't have the same kind of freedom when configuring a notebook's graphics processor, however. There are basically two options available: IGPs (Integrated Graphics Processors) or discrete GPUs. IGPs are graphics processors integrated into a motherboard's core logic chipset. They are a low-power, relatively low-performing option. IGPs typically share system memory and feature either small or no discrete frame buffers.

Discrete mobile GPUs function much like their desktop counterparts and are the higher-performing option. Also, discrete mobile GPUs predominately feature their own frame buffer memory and interface with the system via AGP or PCI-E. Both NVIDIA and ATI have a whole line of discrete mobile GPUs available, targeting different market segments.

Portable Pixels

There are four things to consider with regards to a notebook's screen: size, aspect ratio, resolution, and type (reflective or nonreflective). The notebook's form factor usually determines the size and aspect

Notebook LCD screens are available in a multitude of sizes and aspect ratios.

Graphics Battle Royal

As a *CPU* reader, you're probably aware of the perpetual battle between NVIDIA and ATI for dominance in the desktop graphics arena. There's a significant third party, however, pushing myriad pixels in the mobile space: Intel. However, Intel's presence in the mobile graphics field is felt more in the mid- and low-range markets. Both NVIDIA and ATI have various mobile graphics processors available, targeted at different groups of customers. But Intel has only a few options that are integrated into its mobile chipsets.

Because we're now transitioning between AGP and PCI-E, there are many options available in mobile graphics. There are AGP and PCI-E IGPs, numerous discrete AGP GPUs, and multiple discrete PCI-E GPUs, as well. At the low end, Intel's Mobile 8xx and mobile 9xx chipsets with a "G" designation in their model numbers have either Intel's Extreme Graphics 2 (AGP) or Intel's Graphics Media Accelerator 900 (PCI-E) integrated into the chipset. These GPUs have limited 3D functionality when compared to NVIDIA's and ATI's solutions, but they're well-suited to 2D operations or video playback.

Competing with Intel at the low end are ATI's entire line of Mobility Radeon IGPs (AGP) and their Radeon Xpress 200M chipsets (PCI-E) for Intel and AMD processors. ATI's Mobility Radeon 7500/9000/9200 discrete AGP GPUs also compete at the low end, alongside its Mobility Radeon X300 with HyperMemory (PCI-E). Additionally, NVIDIA offers the GeForce4 440 Go and GeForce FX Go 5200 for low-priced and thin-and-light AGP notebooks and also has the new GeForce 6200 with TurboCache available for similar PCI-E notebooks. These discrete AGP graphics processors all have varying amounts of frame buffer memory, while the low-end PCI-E parts from NVIDIA and ATI use limited amounts of discrete graphics memory in conjunction with proprietary technologies, TurboCache and HyperMemory, to dynamically share system memory.

ratio. The aspect ratio refers to the ratio of width to height of a display. Some newer notebooks feature LCD screens with an aspect ratio of 16:10, as opposed to the standard CRT and LCD ratio of 4:3. These widescreen notebook LCDs usually have WXGA (1,280 x 800), WXGA+ (1,440 x 900), WSXGA+ (1,680 x 1,050), or WUXGA (1,920 x 1,200) resolutions, depending on their size. Traditional 4:3 aspect LCDs are typically available at XGA (1,024 x 768), SXGA+ (1,400 x 1,050), or UXGA (1,600 x 1,200) resolutions.

Some newer notebooks also have high-glare screens that feature wider viewing angles and more vivid color output. Dell calls these screens UltraSharp, and HP/Compaq calls them BrightView, but they're all fundamentally similar. High-glare screens feature a special coating that increases the contrast of the image on display. They are beneficial for users who view movies on their notebooks or need a wider viewing angle, but they're susceptible to glare and aren't well-suited for outdoor environments.

RAM & Storage

Notebooks and desktop machines are bound by the same rules when it comes to their memory and storage; however, notebooks require different form factors. Notebook hard drives are typically 2.5 inches, as opposed to the 3.5-inch drives in desktop CPUs. Also, notebook hard drives are available in several capacities and their performance is generally determined by their spindle speed. Value and mainstream notebooks mostly use 4,200rpm, 2.5-inch hard drives and performance thin and DTR notebooks use 5,400rpm and 7,200rpm drives. The faster the spindle speed, the faster the drive.

Most portable computers use 2.5-inch hard drives, which are one inch smaller than drives in most full-sized systems.

Notebook memory is also available in multiple speed grades and densities. Installing DDR and DDR2 SODIMMs in notebooks is essentially the same as installing them on a desktop machine. To offer more bandwidth, newer mobile chipsets will function in dual-channel mode when the user installs a pair of memory modules. And, as is the case with any PC, more RAM is better. We recommend a minimum of 512MB, but 1GB is preferable.

Networking

Mobile PCs are equipped with the same type of network controllers found in today's desktop machines. Most notebooks ship with some form of wired Ethernet, and the majority of notebooks sold today incorporate a wireless LAN

95% of all mobile PCs sold in 2006 will be equipped with a wireless network adapter. *(Source: IDC)*

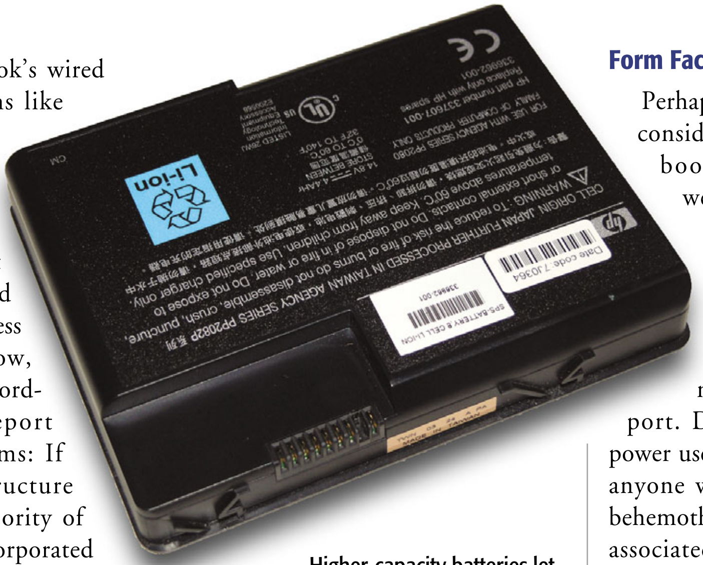
For mainstream multimedia and performance thin notebooks, NVIDIA and ATI have a handful of mobile GPUs in their respective lineups. ATI currently offers the Mobility Radeon 9600/9700/9800 for midrange, performance-oriented AGP notebooks, while NVIDIA has the GeForce FX Go 5700. For PCI-E notebooks in the same market, ATI has the Mobile Radeon X600 and X700. NVIDIA offers its GeForce Go 6400 with TurboCache and GeForce Go 6600. With these products, both NVIDIA and ATI offer mobile GPUs that have all of the same 3D and video-related features as their desktop equivalents. 3D performance isn't always on par with their desktop counterparts, due to clock speed differences and varied frame buffer configurations, but these midrange GPUs are some of the first to offer acceptable gaming performance on notebooks.

At the high end, it's all about performance. Currently at the high end is NVIDIA's GeForce Go 6800 Ultra and ATI's Mobility Radeon X800 XT. The GeForce Go 6800 Ultra is a PCI-E 12-pipeline DX9 GPU that falls somewhere between the desktop GeForce 6800 and GeForce 6800 Ultra in terms of performance. On the other hand, ATI's Mobility Radeon X800 XT is a full 16-pipeline part that's equivalent to the desktop version of the Radeon X800 XT. Both the GeForce Go 6800 Ultra and the Mobility Radeon X800 XT feature discrete GDDR3 memory and performance that meets or exceeds many high-end desktop graphics cards.

All of the graphics processors we've mentioned have things in common. All incorporate architectural features designed to lower their power requirements. NVIDIA calls these features PowerMizer, and ATI calls them PowerPlay. These technologies aren't implemented exactly the same in each company's GPUs, but they are similar. Both technologies let the GPUs dynamically downclock and disable unused portions of the chip when the graphics workload is light and disable PCI-E lanes when full bandwidth isn't needed. ▲

controller, as well. A notebook's wired Ethernet controller functions like a desktop CPU's and is capable of the same speeds, depending on the type of controller.

Only two years ago, about 80% of all notebooks sold did not include any type of wireless network capabilities, but now, less than 5% lack Wi-Fi, according to an In-Stat/MDR report ("The Wi-Fi Field of Dreams: If You Embed Wi-Fi, Infrastructure will Come"). Today the majority of wireless LAN controllers incorporated into laptops offer 802.11b/g functionality. Although, some newer controllers are capable of 802.11a/b/g. Offering a maximum of 11Mbps of bandwidth, 802.11b is the oldest and least desirable of the bunch. On the other hand, 802.11a and 802.11g offer more bandwidth, up to 54Mbps, and 802.11g is backward compatible with 802.11b networks (802.11a is not).



Higher-capacity batteries let you use your notebook for longer periods of time between charges.

The Power Plants

When configuring a notebook, many companies offer several batteries to suit the needs of potential buyers. Two aspects to consider when buying a battery are the number of cells and the battery's Wh (watt hour) rating. The number of cells that make up the battery determine how long it can power a notebook on a single charge. The number and type of cells used also determine the Wh rating of the battery. One watt hour of electricity is equal to one watt of power being consumed for one hour. The higher the Wh rating, the longer a battery can power a notebook before recharge.

Form Factor & Weight

Perhaps the most important things to consider when shopping for a notebook are its form factor and weight. Power users are usually influenced most by performance, but road warriors usually don't mind sacrificing a few features and some performance for a notebook that's easy to transport. DTR notebooks are great for power users who travel infrequently, but anyone who travels with one of these behemoths can attest to the discomfort associated with carrying around a 12-pound notebook. Performance thin notebooks are a good compromise for those who want a relatively high-performing machine but need to carry it around frequently. Many performance thin notebooks are less than 1.5 inches thick and weigh less than eight pounds, but they tend to have large screens that make them bulky.

Mainstream thin-and-light notebooks, however, are designed for constant mobility. They usually have smaller screens, are about one inch (or less) thick, and weigh less than 6.5 pounds. Mainstream thin-and-light notebooks pack lower-clocked processors and mid- to

Stay Connected

Owning a notebook and being mobile certainly has its advantages. Desktop machines may be more powerful and expandable, but they're stationary. You can take a notebook virtually anywhere, and accessing all of your files while traveling is convenient. However, being mobile does have a huge disadvantage that may frustrate road warriors; you might not be able to connect to the Web with your notebook when you're in an unfamiliar locale. But the key to staying connected almost anywhere is to take advantage of all of the technologies incorporated into your notebook, such as Wi-Fi, Bluetooth, wired Ethernet, and maybe even that ancient 56K modem.

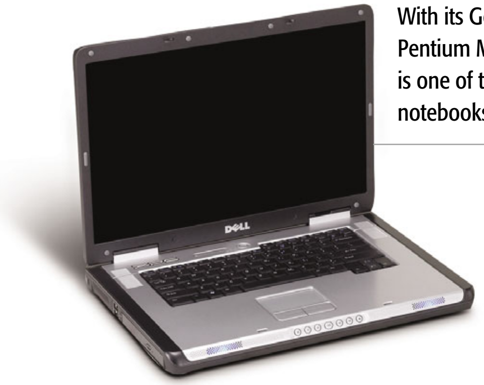
When traveling it's best to be prepared to get connected by any means necessary (as long as it's legal). That means packing an Ethernet cable, phone cable, and adapters for the various types of phone jacks around the world and ensuring that you've got a functional wireless LAN controller. If your notebook and cell have Bluetooth, it may also be a good idea to see if your wireless service provider offers Internet services. Having an Ethernet and phone cable on hand is self explanatory; you can't connect to either a LAN or phone jack without them. Using your notebook's Wi-Fi connection isn't always that simple, though.

Wi-Fi is the term used to describe the 802.11a/b/g wireless LAN standards. The most common types of Wi-Fi equipment use the 802.11b and 802.11g standards. These devices transmit and receive data using the 2.4GHz frequency band. Some wireless LAN devices use the 802.11a standard, which broadcasts at 5GHz, but they aren't quite as common. Users first widely adopted 802.11b devices, which offer up to 11Mbps of total bandwidth and have an effective range of about 300 feet when unobstructed. In turn, 802.11g products are similar to 802.11b products; however, through the use of a higher-speed extension, they offer up to 54Mbps of total bandwidth. Similarly, 802.11a products also offer up to 54Mbps of bandwidth, but they transmit and receive data in a higher frequency band and have a shorter range. When unobstructed, 802.11a devices have an effective range of about 200 feet and are less susceptible to RF interference. In the end, the majority of wireless-enabled notebooks today are equipped with 802.11a/b/g LAN controllers.

So, if you need a connection to the Web, but you don't have access to any wired networks, searching for a Wi-Fi hotspot is your best bet. Many businesses around the world offer Wi-Fi for a nominal fee. There are, however, numerous free hotspots throughout the United States. Before traveling, we suggest consulting a Wi-Fi hotspot directory online, which will list available hotspots by city.

There's also a new Wi-Fi standard on the horizon, 802.11n. In early 2004, the IEEE announced that it planned to develop a new amendment to the 802.11 standard for a new breed of wireless networks. These new networks are proposed to have theoretical peak data throughput rates of at least 100Mbps. In addition, 802.11n is expected to offer increased range over its predecessors. One of the ways 802.11n improves upon previous 802.11 standards is by including MIMO technology. MIMO adds extra transmitter and receiver antennas that help increase data throughput and range via spatial multiplexing.

WiMAX is another emerging technology that should eventually help users stay connected everywhere. WiMAX will purportedly offer wireless coverage measured in square kilometers, rather than the square meters that current Wi-Fi technology offers. When available, a WiMAX base station will transmit high-speed Internet connections in a radius of up to 31 miles. The goal is to have these base stations in major cities to provide Web access to entire metropolitan areas. WiMAX is still a ways off, however, but its future is bright. AT&T, Sprint, and Qwest, among many others, are already planning to test WiMAX in major markets across the United States. ▲



With its GeForce Go 6800 Ultra and fast Pentium M processor, the Dell XPS Gen2 is one of the most powerful gaming notebooks currently available.

low-end GPUs, but their relatively small size and light weight make them well-suited to frequent travelers. Then there are the ultraportables. Ultraportables, as the name implies, are much smaller than any other type of notebook. Some can even fit in the palm of your hand. However, to keep size and weight to a minimum, they usually lack optical drives and feature smaller, low-resolution screens.

Operating Systems

Notebooks run the same OSes as desktop machines. The various flavors of Windows XP are preinstalled on the majority of notebooks sold today, but Linux is a viable option, as well. WinXP Home is usually preinstalled on value or mainstream notebooks for personal use. WinXP Pro, though, is often preinstalled on business-class or performance notebooks. And, the relatively new breed of multimedia notebooks that are equipped with newer GPUs, TV tuners, and high-definition audio have begun shipping with Windows Media Center Edition. Linux is perfectly suited for mobile use, due to its lower hardware requirements, but it's much harder to come by. Only a handful of companies offer Linux as an option on their notebooks; however, many of the popular distros incorporate drivers for the most common pieces of hardware used in today's notebooks.

Your Turn

Seeing that we've gone over some aspects of mobile computing and the core components of a typical notebook, you can now build your very own notebook. Check out our article ("Your Notebook, Your Way") starting on page 54 for more information on how to build your own notebook. Also, you can find a notebook roundup on pages 63 to 64 and some cool mobile gear starting on page 65 ("Gear Gone Mobile"). ▲

by Marco Chiappetta

Great Moments In Mobile Computing

April 1981	The world's first portable computer, the Osborne 1, is released.
January 1983	The first color portable PC is announced, the Commodore SX-64.
1985	ATI is founded.
September 1989	Apple releases the 17-pound Mac Portable.
October 1990	AMD releases the Am286 ZX and LX microprocessors for low-power, portable computers.
1990	Intel announces the low-power 80386SL processor.
1993	NVIDIA is founded.
1995	Transmeta is founded.
November 1998	The ATI Rage Mobility M is released for high-performance notebooks.
Q1 2002	AMD begins shipping mobile Athlon XP processors.
March 2003	Intel launches the Centrino mobile platform and releases the first Pentium M processors.
September 2003	The AMD Athlon 64 is launched for desktop replacement notebooks.
January 2004	AMD begins shipping Mobile Athlon 64 processors.
May 2004	Intel ships new Pentium M processors based on the Dothan core.
October 2004	The OQO Model 1 ultraportable computer is released.
February 2005	NVIDIA announces the availability of the GeForce Go 6800 Ultra.
March 2005	The low-power AMD Turion 64 platform is launched.
June 2005	ATI announces plans to release the 16-pipeline Mobility Radeon X800 XT.
Q4 2006	Intel set to release the dual-core Yonah mobile processor.

The 24.5-pound Osborne 1 had a 4MHz processor, 64K of RAM, and a built-in five-inch monitor.

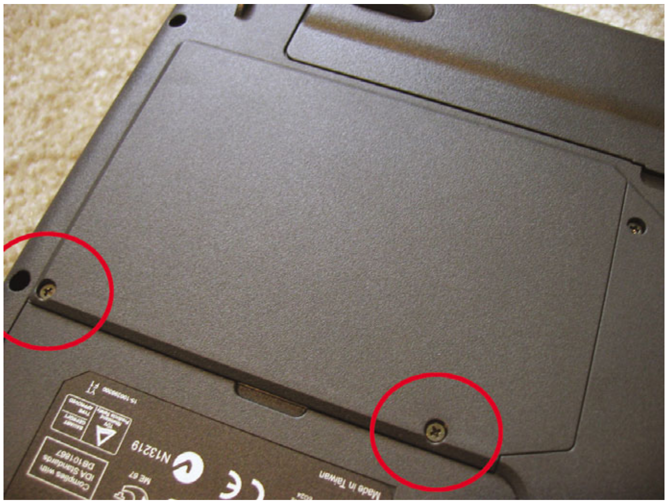
The OQO Model 1 sports a 1GHz processor and 256MB of RAM, yet it's only 0.9 x 4.9 x 3.4 inches (HxWxD) and weighs 14 ounces.

How To Build Your Own Notebook PC

When Buying Pre-Built Just Won't Cut It

If you want something done right, you have to do it yourself. Not that there's anything wrong with the world's most prolific notebook manufacturers, but power users are notoriously fickle, and it can be difficult to configure a model to your ideal performance, price, and personality specifications. Although specialty builders will sell you a dolled-up chassis for several thousand dollars, good looks alone don't make a dream machine.

Why not piece together your own Mecca of mobility? It isn't as hard as you might think. In fact, the transition to Intel's second-generation Centrino platform makes a DIY project easier than ever with new standards such as PCI Express and Serial ATA. That's not to say you can custom-create an ultra-powerful desktop replacement with the processor and graphics card of your choice. There's a lot of finesse involved in getting delicate electronic components properly optimized for power consumption and heat output. But with a little research, you should have no trouble handpicking the parts for your next notebook.



Ready, doctor? The first step in your operation is to remove two screws holding the hard drive cover in place. Set them aside and pull back the plastic cover.

A Case For DIY

Why even bother playing system builder when numerous top-tier firms are more than happy to do the job for you and throw in a warranty to boot? Is a home-brewed solution any cheaper than a name-brand laptop? Will it be any faster? Will it give you a clearer pathway for upgrading later on should graphics or processor technology advance?

In the past, building a gaming PC, graphics workstation, or entry-level server was a sure way to save plenty of money. That's more of an exception than a rule on the desktop, but notebooks are still packing sizable premiums. Take the Toshiba Qosmio G25, a multimedia powerhouse that wields a 2GHz Pentium M, 1GB of memory, a 17-inch widescreen display, NVIDIA's GeForce Go 6600 with 128MB of RAM, twin 60GB hard drives, and a dual-layer DVD burner. Impressive in its own right (though hardly rivaling anything you'd gawk on a gaming desktop), Toshiba charges about $3,000 for the G25. Bear in mind that you can get an Athlon 64 X2 and a pair of GeForce 7800 GTX cards with twice the hard drive space and a decent motherboard for less.

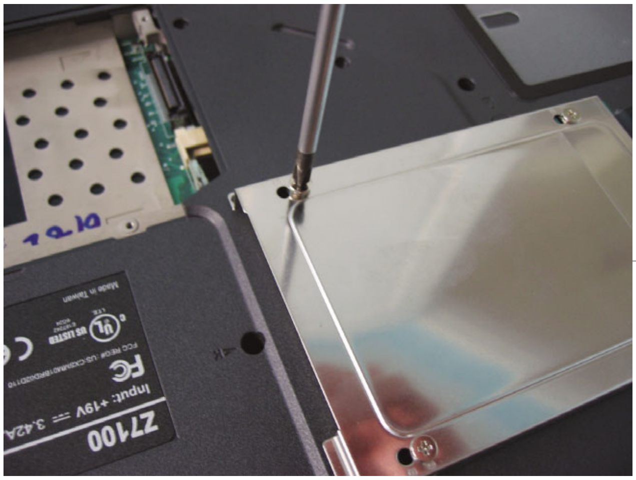
On the contrary, an ASUS Z71V notebook chassis costs a little more than $800. It includes a gorgeous 15.4-inch widescreen LCD supporting resolutions up to 1,680 x 1,050, the same GeForce Go 6600 add-in PCI-E adapter, an integrated 56Kbps

Components & Price

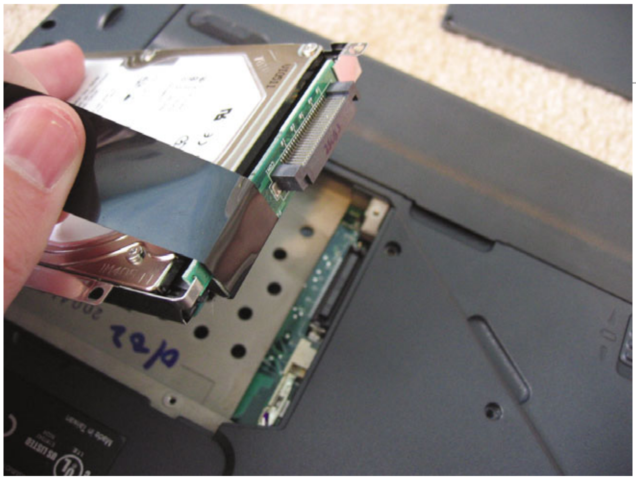
Notebook components aren't as blatantly plentiful as the stuff you drop into your desktop system. Thus, we did some of the research for you. From here out compiling prices and Web sites should be a piece of cake. By the way, we also verified that each vendor listed here is on the up and up with a solid Resellerratings.com score of eight or higher.

If none of our suggestions interest you, there are numerous alternative configurations. ASUS' Z81K accommodates a Socket 754 Athlon 64, Sempron, or Turion processor through NVIDIA's nForce3 Go150 chipset. Because it's an AGP platform, ATI's Mobility Radeon 9700 is the best graphics adapter you can get with the Z81K. The 3.3-pound Z33A is also solid alternative, supporting any current 400 or 533MHz Pentium M processor, DDR2 memory, and the integrated graphics core inherent to Intel's 915GM chipset. The Z33A features a built-in CD writer with DVD-read capabilities, hi-def audio, and carbon fiber-alloy construction. If you're looking for a highly mobile solution and don't mind sacrificing the discrete 3D controller, the Z33A is truly sweet. ▲

	Price	Location
ASUS Z71V Chassis	$760 $830 w/ CD burner	www.pcconnection.com www.rjtech.com
2GHz Pentium M	$449 $470	www.zipzoomfly.com www.pcuniverse.com
1GB (512MB x2) OCZ DDR2-533 SO-DIMM	$115 $120	www.newegg.com www.tigerdirect.com
100GB Seagate Momentus 5400 RPM	$173	www.newegg.com
Toshiba SD-R6472 dual-layer DVD burner	$95 $99	www.newegg.com www.mwave.com
Intel 2200BG wireless module	$28 $30	www.buy.com www.cdw.com
WinXP Pro OEM	$145	www.newegg.com



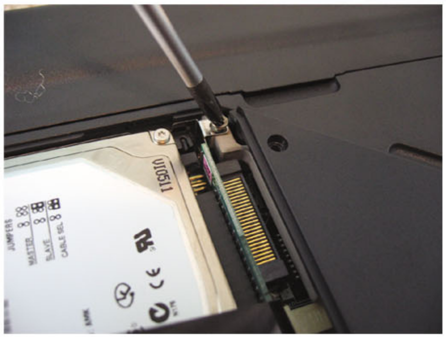
Pull the empty drive bay out, mount the drive in the bay, and screw it in using four included screws. The holes on 2.5-inch drives are all underneath the drives.



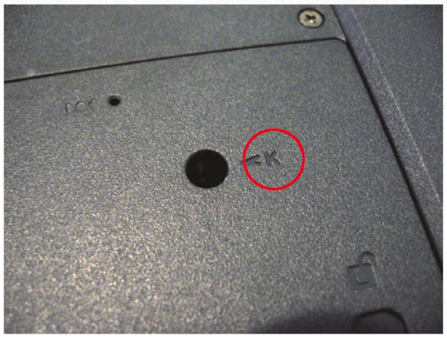
Once you've attached the appropriate interface connector (either IDE or SATA), slide the mounted drive back into the chassis rear-end first, lining it up with the motherboard connector. Press down softly to snap them together.

modem, Gigabit Ethernet, five USB 2.0 ports, a card reader, and a bundled battery purportedly worth six hours of run time. A 2GHz boxed Pentium M 760 will set you back $450, while 1GB (2 x 512MB of DDR2-533) of memory costs $115. In the interest of conserving battery life, opt for a single 100GB hard drive rather than two repositories. The $175 you'll pay is admittedly steep compared to desktop storage, but it's plenty for most laptops. The grand total comes to $1,540—well below the Toshiba's price and with roughly similar specs. You could even add $100 for a Toshiba dual-layer DVD burner and $150 for an OEM copy of Windows XP Professional. The final price is still $1,000 less than the pre-built notebook.

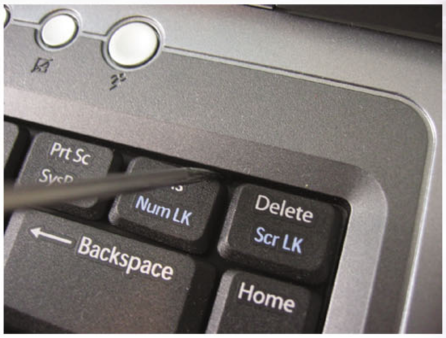
So there's a clear financial justification for building a notebook from the comfort of your living room. Does that mean you will consequentially sacrifice quality in the name of saving a few bucks? Absolutely not. In fact, the ASUS Z71V is known for its sturdy build-quality and compelling design. It's one of the many foundations on which value-added resellers use to build their own notebook brands. It has to be strong enough to compete with a Dell or Compaq, or else the small market of whitebook resellers would disappear entirely.



Reaffix the one screw that secures the hard drive mounting tray and get ready to install some memory. See, that's not so hard, is it?



The first memory slot is located under the keyboard. Before you can remove it, though, you'll need to remove two screws on the chassis underside that are labeled with a K.



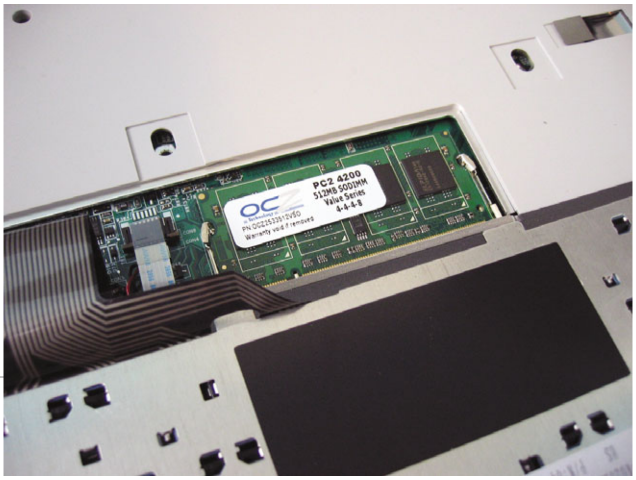
Press the three tabs holding the top of the keyboard in place. Slowly slide it up toward the LCD, taking care not to overextend the connected plastic cable. Fold the keyboard back to reveal memory slot number one.

Companies manufacturing notebook shells used to refrain from promoting them, similar to the apprehensive approach first applied to K7 boards when AMD launched its Athlon. Now companies such as Arima, ASUS, Foxconn, and Uniwill actively advertise mobile platforms. They are still principally intended for small resellers with an opportunity to outmaneuver sluggish OEMs. Even a majority of the online outfits selling bare chassis offer build services for a nominal fee.

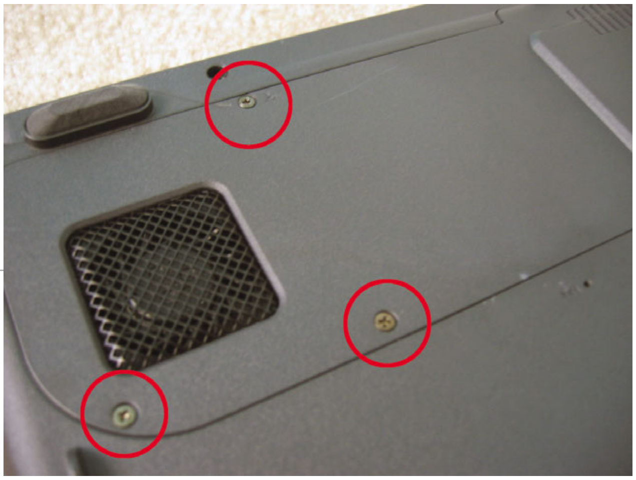
The longstanding conception is that notebooks are somehow more difficult to assemble than PCs. As increased visibility of platforms and parts illustrates, however, power users are frequently setting their apprehensions aside and learning as they go. Fortunately, heightened attention to detail is paving the way for better notebook designs, which of course are much easier to work around.

Starting From Scratch

In the desktop PC world, a blank slate is an aluminum or steel case and a pile of parts on the floor. Each piece has its own instruction manual, driver package, and logical interface. No matter who you buy from, boards, cards, and modules are designed to work in concert. The notebook world isn't completely standardized,



Voila. This area eluded us for a whole week before an ASUS rep clued us in. Plug in your first module at a 30-degree angle and push down until both latches snap into place. Button it all back up and flip the notebook over.



Nine screws line the second plastic cover. Remove them all and lift the cover, cauterizing if necessary (just kidding).

Benchmarking Our DIY Notebook

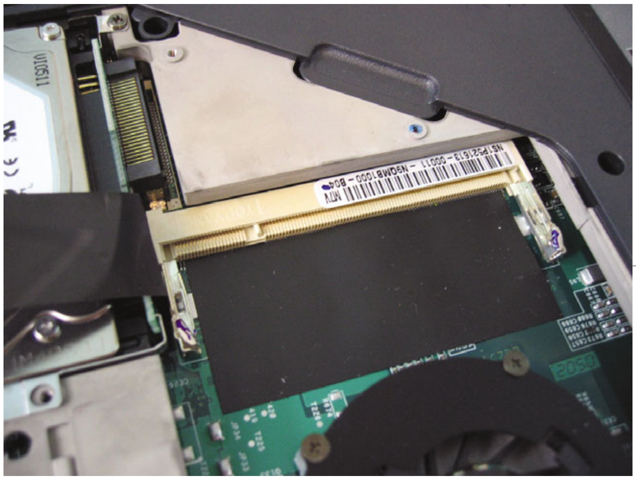
Experts have been saying for years that laptops are gradually catching up to desktop PCs in the performance department. Many experts, however, fail to take into account how quickly desktops evolve. Understandably, it's a little difficult to make direct comparisons between the two when one usage model is going bananas over 100W+ dual-core processors and 24-pipe graphics cards, while the other is excited about 35W designs that work with passive coolers. Despite divergent design principles, notebooks are measured by many of the same yardsticks that are used to judge conventional desktop machines. Boot times, gaming performance, and multitasking alacrity all still key indicators of power. Add battery life, weight, and durability to the list, however, when you're evaluating a mobile solution.

A high-end notebook can perform many of the same tasks as a desktop, but there are natural compromises. If you want thin and light, give up the GeForce Go 6800 Ultra. Want to ram an Athlon 64 in a notebook shell? You had better buy a backpack with supportive shoulder straps because it is going to be heavy. Don't expect much in the way of battery life, either. Ultimately, you need to determine which attributes to pursue in a notebook. Bare chassis exist to suit almost any classification.

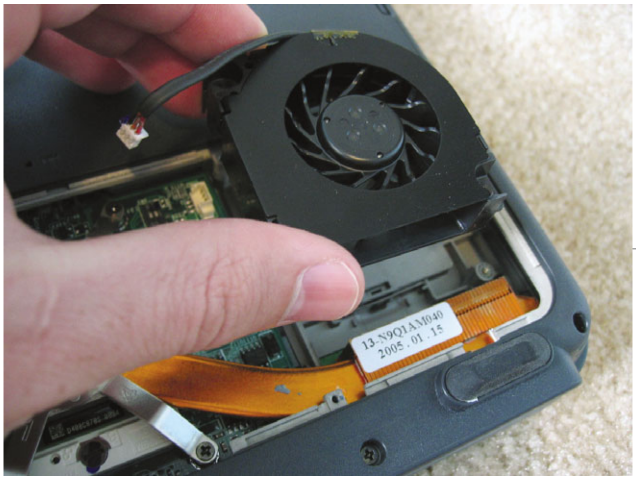
Our test platform balances performance, weight, and longevity. It sports a 2GHz Pentium M, two 512MB OCZ Value Select DDR2-533 memory modules, NVIDIA's GeForce Go 6600 with 128MB of memory, a Seagate 100GB 5,400rpm hard drive, ASUS DVD+R/RW burner, Intel 2200BG MiniPCI card, and Intel's 915PM chipset.

The desktop comparison system wields an AMD Athlon 64 X2 4800+; 1GB of Corsair Pro-series, low-latency DDR400 memory; ATI Radeon X800 Pro graphics card; Western Digital Raptor 10,000rpm drive; and ASUS A8N-SLI Deluxe motherboard. This obviously isn't an even match when you compare raw processing and rendering power, but the idea is to test a high-end notebook against an equally cutting-edge desktop and let the chips fall where they may.

Although the press might be buzzing about dual-core notebook processors and 12-pipe graphics modules toward the end of 2005, it's clear that today's notebooks still trail the heartiest desktop



The second memory slot should be immediately visible. Install another module and ready yourself for doing a little processor transplant.



Uninstall the CPU fan by removing its two screws and pulling its fan connector. The plastic housing should lift right off.

so a chassis from one vendor won't work with a logic board from another and a third-party graphics adapter. Instead, starting from scratch consists of using a simple platform, including the LCD assembly, motherboard, keyboard, touchpad, and all of the necessary I/O. It is also common for manufacturers to preinstall a graphics solution, whether it's integrated or discrete.

That leaves a CPU, memory, hard drive, optical drive, wireless networking solution, and OS. A year ago, some of those parts may have been difficult to track down. Now everything is available in a nice, neat box, just as you'd buy desktop components. Even Intel's Pentium M processor, star of the Centrino triumvirate, is available at retail. The bottom line is that you have choices. Build an Athlon 64-based desktop replacement. Build a P4 machine. Try your luck with AMD's new Turion 64 (good luck finding the processors, though) or balance performance and mobility with the popular Centrino design.

Lead By Example

We wouldn't encourage you without first walking the walk. Thus, we acquired an ASUS Z71V notebook on which to demonstrate the fundamentals of building a hearty laptop. It's worth noting that although ASUS includes a rudimentary technologies. But let's not just draw the line there. Where might you realize gains in the months to come or even today?

Processor performance currently lags, despite the otherwise phenomenal gaming alacrity the Pentium M demonstrates paired to faster graphics hardware. The Dr. DivX file conversion takes significantly longer than AMD's Athlon 64 X2. And while the X2 4800+ does realize some gain from multithreaded programming in that app, much of its efficiency derives from memory performance. Perhaps a newer Pentium M chip utilizing the platform's 533MHz FSB support would bolster these benchmarks.

Surprisingly, the Z71V also suffers curiously low throughput numbers, according to PCMark04, which is probably hurting the notebook's overall performance. It's unusual to see DDR2-533 modules score so far below a DDR400 setup, and SYSmark 2004 would seem to confirm the results with lackluster content creation results. The 915PM chipset is capable of dual-channel numbers up to 8.5GBps, so maybe a BIOS update from ASUS will improve the timing settings, especially because the shipping CMOS doesn't facilitate any sort of performance modification. Then again, it'd be tough to realize more bandwidth through a 400MHz processor bus.

More stunning is the frame rate drop-off in Half-Life 2. Some of that's due to the processor and memory combination. However, there's no replacement for displacement, and the Go 6600's eight-pixel pipelines are no match for a 12-pipe card with a 256-bit memory bus. Even the mighty GeForce Go 6800 will lose out to high-end desktop cards, all the while dissipating 66W in an unwieldy desktop replacement shell. As a result, PCMark's graphics test shows the Go 6600 performing at one-third the level of ATI's Radeon X800 Pro.

Finally, a 100GB 5400 RPM hard drive offers a good deal of capacity and reasonable performance. It isn't a power hog, either. The WinRAR compression test demonstrates less than stellar disk performance, unfortunately, which is another potential bottleneck jamming up usage in such tests as SYSmark. You can step up to a 7,200rpm drive, matching the access times of many 3.5-inch offerings if you're willing to pay the substantial price premium. You'll also pay a higher-power budget, though, and 100GB+ capacity 2.5-inch drives are still very hard to find. ▲

	Athlon 64 X2 Desktop	**Pentium M Notebook**
Benchmark		
Dr. DivX (845MB VOB, 1,000Kbps, 1-pass)	13:14	18:10
WinRAR (500MB folder)	4:02	5:28
PCMark04 Build 1.3.0	6948	3907
CPU	6671	3790
Memory	4708	2948
Graphics	7726	2574
SYSmark 2004		
Overall	243	140
SYSmark 2004 Internet Content Creation (Overall)	310	181
3D Creation	287	178
2D Creation	354	220
Web Publication	292	152
SYSmark 2004 Office Productivity (Overall)	190	109
Communication	160	93
Document Creation	239	171
Data Analysis	180	82
SPECviewperf 8		
3ds Max	16.14	10.91
CATIA	13.21	9.899
EnSight	23.39	6.443
Lightscape	22.24	10.99
Maya	17.99	19.97
Pro/Engineer	15.88	11.13
SolidWorks	12.3	8.092
Unigraphics	16.18	3.46
Half-Life 2		
1,600 x 1,200 (High 4XAA 8XAF)	61.28	13.28

manual on operating the Z71V, there's no official guide for piecing it together. That's a critical omission, considering a majority of customers interested in the chassis are going to be first-time architects. We nevertheless tackled the job confident that our award-winning system-building skills would serve us well. (Shameless self promotion: *CPU* took third place at TigerDirect.com's eighth-annual Build Your Own PC charity race at this year's CES.)

The easiest way to approach installation is one component at a time. Provided you already have the few components necessary to operate, start with the hard drive. Our Z71V shipped with its battery uninstalled, but if your model didn't, turn the notebook over and remove the battery. Most hard drives are either secured by a cover underneath the chassis or a slide-out tray on the side. ASUS' Z71V uses a cover held in place by two screws. Remove those screws and pull back the plastic cover. Below you'll see an empty hard drive tray with another screw to remove. Once liberated the housing should be easy to lift away.

Next, place your new hard drive in the housing. Notice the four screw holes underneath the drive as opposed to the sides where you'd find them on most 3.5-inch desktop samples. With the housing assembled, attach the IDE or SATA hard drive connector that corresponds with your disk. The IDE adapter has a missing pin to ensure proper orientation. It's now possible to reinstall the housing. Make sure the hard drive interface is plugged in completely by pushing on it gently. Reattach the screw responsible for keeping the hard drive enclosure from moving. Leave the outer cover off, though, as the next step involves pulling more plastic from the Z71V's underbelly.

Memory Installation

Based on the Intel 915PM chipset, ASUS' Z71V uses a dual-channel memory architecture that combines a pair of 64-bit channels running at up to 533MHz and yielding a maximum 8.5GBps of bandwidth. If you want

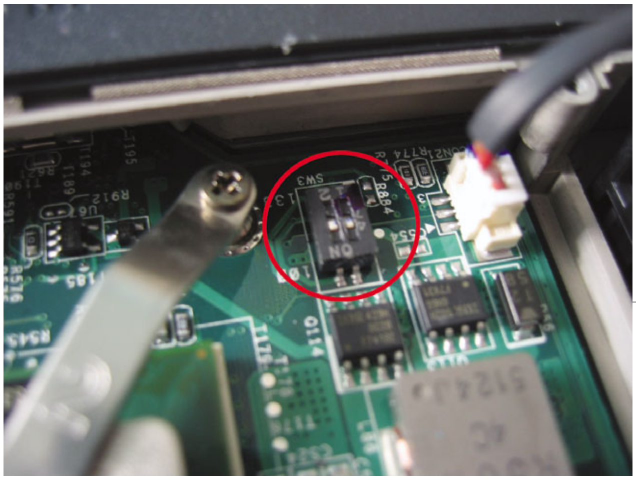
Key Tips For Building A Notebook

Building a notebook isn't entirely different from building a desktop, with the obvious exception that you're working in much tighter quarters with much smaller tools. That said, novice builders should heed a few tips to make the job a little easier.

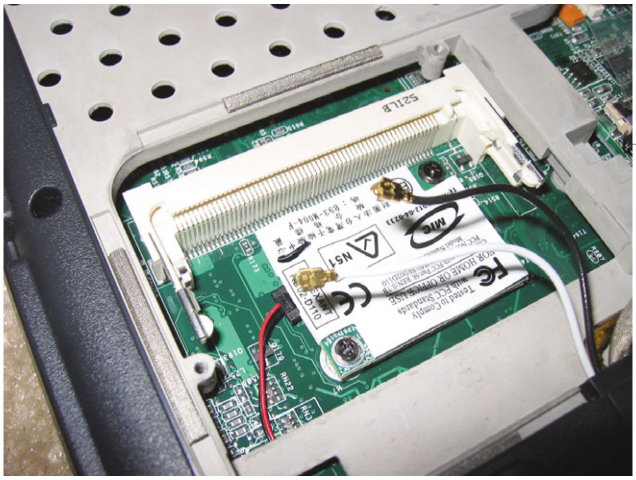
First, don't start building until all your components have arrived. Everything in a laptop is small, and it's too easy to misplace a screw or two during the week it might take for different pieces to arrive. (This tip comes from experience, folks.)

Keep plenty of tools handy when it comes time for installation. Screwdrivers are a must, as are a set of slender fingers. Tiny screws can and will fall into the most inopportune crevices as you piece everything back together. (Again, this is experience talking.)

Finally, work on a large, flat, clean countertop. It's much easier to keep an eye on loose parts, and you're less likely to inadvertently damage sensitive components as you flip an empty chassis from one side to another, madly looking for that second memory slot. ▲



If you're using a 533MHz Pentium M, leave this DIP switch in its default position of 0. Older Pentium Ms on 400MHz buses require moving both switches to 3.

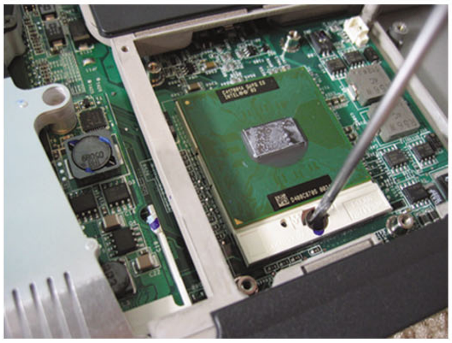


With the processor installed and configured, shift your attention to the last empty slot used for communications upgrades. Note that the component immediately visible is the GbE controller.

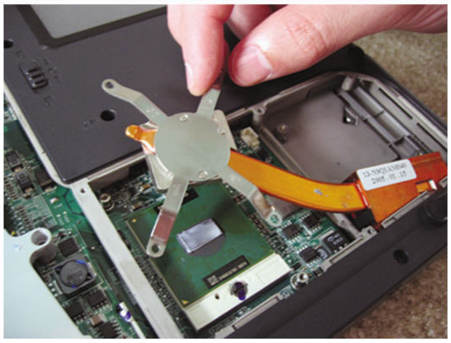
to unearth the core logic's full potential, it'll take two matched memory modules. For us, twin OCZ PC2-4200 200-pin SODIMMs do the trick nicely. Just pick your capacities carefully because upgrading later means ditching whatever you buy today.

Space is allocated very carefully in a complex notebook design, so it's hardly surprising the Z71V's memory slots are each in different spots: one next to the hard drive enclosure and one under the keyboard. Getting to the first requires removing the remaining bottom cover, which is attached with nine small surface screws. You needn't mess with any of the recessed screws, as they hold the chassis together. The vacant memory slot should stick out like a sore thumb once you lift the plastic piece away. Seat the 200-pin DIMM at a slight angle and gently push down until both latches snap into place.

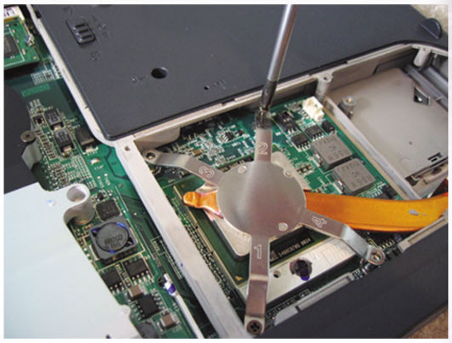
Accessing the second module requires first removing the keyboard, which won't just snap off. You'll first need to remove two screws under the chassis labeled by the letter K. Turn the shell over and open it up. If you look closely, you'll notice three equidistant clips holding the keyboard in place. Press down on each with a flathead screwdriver to release them. Slide the keyboard insert forward to free the



After unscrewing the retaining bracket and setting the heatpipe assembly aside, drop a Socket 479 processor in the empty interface. It shouldn't require any pressure. Lock the chip into place by turning the embedded screw clockwise.



Getting the cooling assembly back into the chassis can be a little tricky. Tilt the assembly at an angle and move it around carefully until the screw holes line up again.



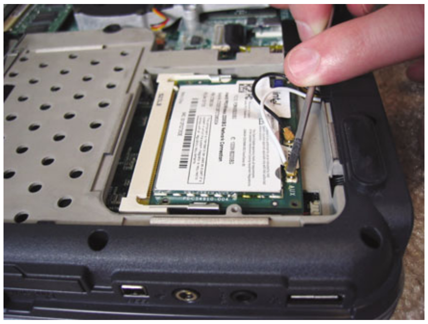
Get the screws back on, taking special care to abide the proper order. Screw the fan back in and attach its power lead.

bottom tabs and fold it over to reveal the second memory slot. Install your final module as you did the first and reinstall the keyboard. Secure both support screws to finish the job.

Brain Surgery

With a repository for storing data installed and two sticks of DDR2 memory ready to rumble, it's time to give the Z71V some smarts. Intel, for all its marketing muscle, doesn't make it a habit of sampling Pentium M processors. However, we were able to get our hands on a 2GHz model that served our testing purposes well. As luck would have it, the Z71V extends backward compatibility to 400MHz Pentium M processors through an onboard DIP switch, even though 533MHz bus support is one of the chipset's hallmark features.

Start by removing the two screws on the cooling fan. Disconnect the fan's power cable and set the fan aside. Next, unscrew the CPU retention mechanism. You should now be able to free the entire cooling apparatus, exposing the Socket 479 interface. There's a nonremovable screw embedded into the ZIF socket, which locks the processor in place once you've installed it. Verifying the interface is indeed unlocked, carefully drop your Pentium M in place and twist that screw to the locked position.



Apply the same technique used on the memory modules to install the wireless controller card. Then, attach the black antenna to the Main lead and the white to the Aux lead. A flathead screwdriver might make it easier to snap on.

One of the Pentium M's best attributes is its manageable thermal spec, which lets a 2GHz chip operate at full speed with little more than a pint-sized copper radiator and tiny fan keeping it cool. Efficient heat transfer is what enables such diminutive devices. Therefore, it's important to use a quality thermal paste or pad between the CPU core and thermal module. Make sure your processor is sufficiently covered before reassembling the retention mechanism.

Getting the radiator and heatpipe back into place can be frustrating, so start by tilting the device forward just slightly and inserting it radiator-first. It will probably take some twisting and turning to re-establish proper fitment. Thankfully, you'll probably only have to do this once. Next, secure the four retention screws, taking care to attach them in the order etched into each arm. This way pressure is distributed evenly across the processor die. Set the fan bracket into place and reattach its two screws. Finish by plugging in the three-pin power lead.

Depending on your processor, the Z71V may require some manual adjustment. Whereas desktop motherboards are configurable in software, notebooks haven't yet evolved to that point it seems. Fortunately, there's just one switch next to the socket interface that's used to configure CPUs with 400 or 533MHz front side buses. If you're using a newer Pentium M "Dothan" core designed to complement the 915PM chipset, set switches 1 and 2 to the default position of 0. If you choose a Celeron M or older Pentium M chip on a 400MHz bus, you need to set the tiny DIP switches to 3, the opposite position. Such flexibility allows the Z71V to support any processor in Intel's Socket 479 arsenal, even unreleased models up to 2.5GHz, according to ASUS.

Look Ma, No Wires

Three components together define Intel's Centrino initiative. The first is its

Pentium M, which we have already installed. The second is an approved chipset, formerly the 855 chipset family and now the 915-class core logic. Third, Centrino is all about wireless connectivity by virtue of an Intel MiniPCI module, either the PRO/Wireless 2200BG or the 2915ABG. Combining all three within a notebook chassis yields the essence of what Centrino is all about: performance, connectivity, manageable form factors, and extended battery life.

To save a few bucks and anticipating a dearth of 802.11a wireless hotspots in our suburban test environment of Bakersfield, Calif., we chose Intel's PRO/Wireless 2200BG adapter, available for less than $30. The mini-PCI slot on ASUS' Z71V should already be exposed, right under the hard drive. You'll notice the GbE controller directly under where the wireless card will lay.

First, you will insert the card at a slight angle, just as with the memory modules. The card only fits one way, so if you encounter resistance, check the card orientation. Push down gently until both latches snap into place. Next, you'll need to attach the antennas. The main antenna is a black wire, and the white is auxiliary. Technically, they should both snap into receptacles on the card, but pushing them by hand is difficult. Instead, use a flathead screwdriver to press each lead onto the connectors.

With the hard drive, memory modules, processor, and wireless adapter all installed, reaffix the back cover and replace the nine screws. Put the hard drive cover back on, along with its two smaller screws. From a hardware perspective, the job is pretty much finished. What's left is to boot the machine, configure its BIOS, and install an OS. The first time we started our test platform, it failed to boot. Much hardware swapping eventually flushed a defective memory module. A drop-in replacement fixed everything and sent us on our way.

In Retrospect

Do you remember the first time you built a desktop PC and the feeling of accomplishment that surged when the platform POSTed granting you BIOS access? A home-brewed laptop will give you that same moment of pride, if only because you were able to procure all the parts and struggle through an installation instead of paying an inflated asking price to a pompous OEM for comparable equipment.

The time is right for DIYers to explore notebooks. Mobile hardware is readily available; the prices are right when you spec out an entire job; and installation is basic enough if you can follow instructions. Best of all, you won't get a hard drive full of garbage demo software, your WinXP purchase will yield an actual installation disc rather than some recovery rubbish, and when friends ask why your notebook isn't marred by branding, you can coolly explain that it was custom-built from scratch with the need for speed in mind. ▲

by Chris Angelini

A Guide For Upgrading

Building a laptop is fairly easy, but upgrading is still a major sticking point. You still can't swap out certain critical components, such as motherboards and graphics modules. Those that you can—memory, network, and processors—generally aren't worth replacing after you spend a small mint buying them. Most notebooks only have two DIMM slots, and because the latest designs are dual-channel, you'll want to fill them both immediately. Upgrading later means tossing at least one module, which isn't an attractive prospect. How about processors? If Intel's next-gen platform employs a 667MHz bus and new power requirements as a consequence of adopting dual-core, you'll be constrained to existing and forthcoming 533MHz Pentium M chips. Based on Intel's conservative release schedule, there likely won't be many more models from which to choose, either.

A more likely upgrade is storage. ASUS' Z71V supports PATA and SATA hard drives for maximum flexibility. You can use 4,300, 5,400, or 7,200rpm drives of any available capacity. If a 200GB model emerges sometime next year, swapping drives is a 10-minute procedure. Slim optical drives are also pretty much standardized, so adopting a 4X or 6X dual-layer burner later should be little trouble.

The real avenue for upgrading doesn't require popping the cover on your notebook, though. Because most road warriors will never disassemble their systems, many external interfaces exist for quick and easy peripheral hookup. USB 2.0 is perhaps the most familiar, providing a 480Mbps pathway. External hard drives, keychain thumbdrives, and external optical drives all make for easy upgrades thanks to USB 2.0. FireWire serves a similar purpose, facilitating connections to external storage devices and digital video equipment.

Naturally, notebooks don't have add-in interface slots like desktop motherboards. Thus, the PC Card was developed to accommodate PCI-like upgrades that'd operate at up to 33MHz using 32-bit bus mastering. Sound cards, TV cards, network cards, and wireless adapters are all available in PC Card format to give your laptop extra functionality.

ExpressCard is the evolutionary replacement for existing CardBus peripherals, utilizing PCI-E and USB 2.0 simultaneously.

It might surprise you to learn that the first 16-bit PC Card revision was defined in 1990, more than 15 years ago. And although the standard is still in heavy rotation today, second-generation Centrino hardware proactively introduces another upgrade path designed by the PCMCIA. Simultaneously supporting PCI-E and USB 2.0, ExpressCard will enable hot-plug TV tuning, IEEE 1394b (at up to 800Mbps), Bluetooth connectivity for cell phones, and GbE, according to Brad Saunders, the PCMCIA chairman. The interface even has enough throughput to handle WiMAX and digital tuner cards. Both components are in development and should be available within the next two quarters. ▲

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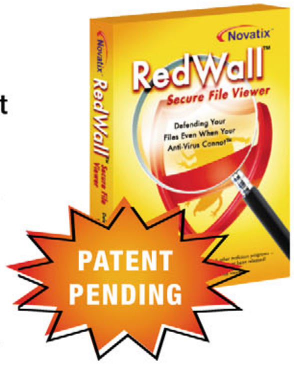

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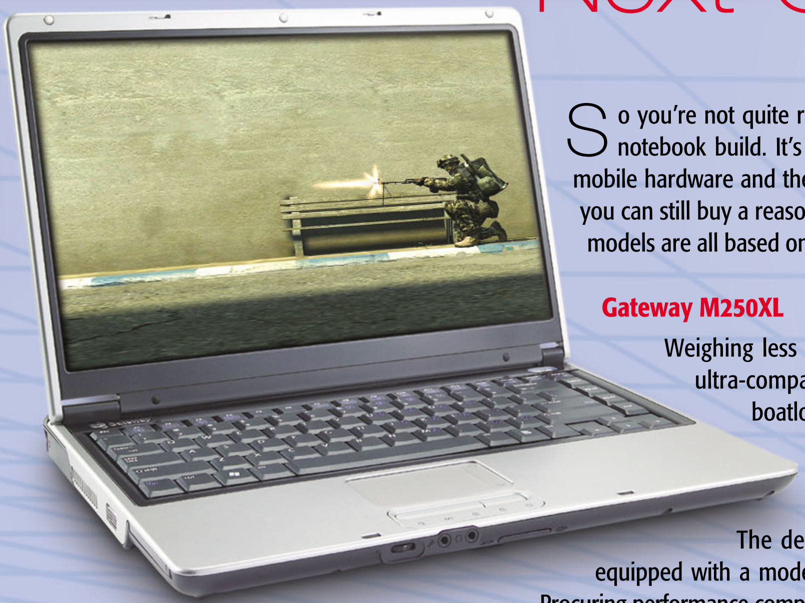
Next-Gen Notebooks

If Building Isn't Your Bag



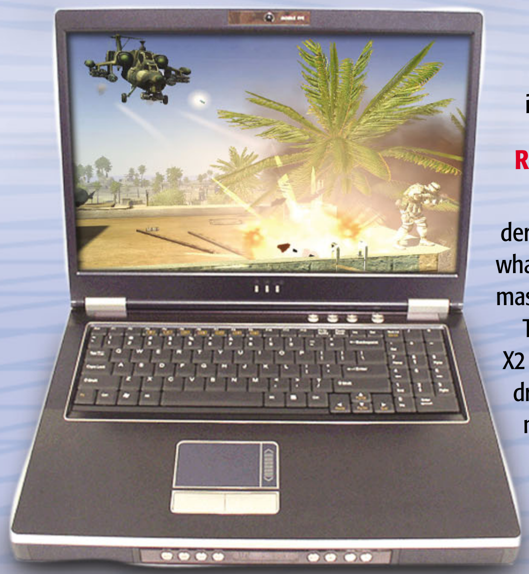
So you're not quite ready to don the mask and put the scalpel to skin yet with your own notebook build. It's understandable, really. Not everyone wants to spend top dollar on mobile hardware and then go snorkeling under the hood for screws and latches. Fortunately, you can still buy a reasonably priced high-end system from a reputable vendor. The following models are all based on today's most cutting-edge platforms.

Gateway M250XL

Weighing less than five pounds, the Gateway M250XL falls within the company's ultra-compact classification. Despite its diminutive size, the notebook packs a boatload of functionality into the chassis. There's an Intel 915GM chipset, which pairs up to Pentium M processors and DDR2 memory. You also get an 80GB hard drive, integrated dual-layer DVD burner, 6-in-1 card reader, GbE, and wireless functionality.

The default configuration is priced at a compelling $1,299, although it's equipped with a modest 1.86GHz processor, 512MB of memory, and Windows XP Home. Procuring performance comparable to our home-brewed notebook solution will set you back $1,650, plus you'll lose out on the discrete graphics and 100GB hard drive. Instead, Gateway's offering utilizes Intel's GMA 900 integrated core.

Nevertheless, performance in office productivity apps should be reasonably strong. The widescreen 1,280 x 768 screen is appropriate for a 14-inch panel and an optional second battery can help extend power up to seven hours, according to Gateway. Overall the M250XL is a solid bid in the thin-and-light market.



Rockdirect Xtreme 64

Intel is expected to offer dual-core notebook processors by the year's end. Of course they'll be derivatives of today's Pentium M on a 65nm-manufacturing process. And it's still too early to tell what performance will look like. If you'd rather not wait, British manufacturer Rockdirect offers a massive desktop-replacement alternative with equally enormous specifications.

The Xtreme 64 (starting at $4,000) can accommodate any AMD Athlon 64 processor, including an X2 4800+ or an FX-57, which calls for serious cooling capacity. The system has a pair of 2.5-inch hard drive bays for 200GB worth of storage. ATI's Mobility Radeon X800 XT Platinum Edition enables immersive 3D with 256MB of GDDR3 memory. It even does DVI output for connection to an external flat-panel monitor. Optional features include an internal TV tuner card and second DVD writer.

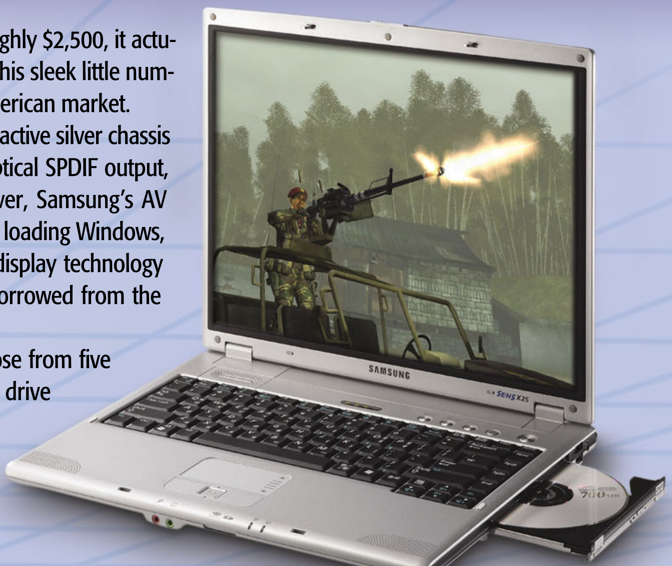
There's no word from Rockdirect regarding the Xtreme's weight or battery life numbers. Without question this isn't going to be a system you take on an airplane. Rather, it's a gaming workstation you move from one place to another, plugging it into wall sockets along the way.

Specification Break Down

Depending on your needs, any of these notebooks are reasonable alternatives to building your own notebook system. Of course, each has specifications that coincide to its asking price. Here's a look at what you get for your dollar.

	Gateway M250XL	**Rockdirect Xtreme 64**	**Samsung X25**	**Dell Inspiron XPS2**	**HP L2000 SE**
Processor	Intel Pentium M	AMD Athlon 64 FX/X2	Intel Pentium M	Intel Pentium M	AMD Turion 64
Memory	512MB DDR2-533	Up to 2GB DDR400	512MB DDR2-400	Up to 2GB DDR2-533	Up to 2GB DDR400
Graphics	Intel GMA 900	Radeon X800 XT PE 256MB	Radeon X600 128MB	GeForce Go 6800 256MB	Radeon Xpress 200M
Hard Drive	80GB	Up to 200GB	80GB	60/80/100GB	60/80/100GB
Screen Size (inches)	14	17	15.1	17	14
Native Resolution	1,280 x 768	1,680 x 1,050	1,400 x 1,050	1,920 x 1,200	1,280 x 768
Networking	10/100/1,000; 802.11b/g	802.11b/g Bluetooth	10/100/1,000; 802.11a/b/g Bluetooth	10/100/1,000; 802.11b/g	10/100; 802.11b/g
Battery	6-cell Li-Ion	Unknown	53Wh, 80Wh Li-Ion	9-cell Li-Ion	6/12-cell Li-Ion

Samsung X25



Don't let the price reference fool you. Although the X25 HVM 750 starts at roughly $2,500, it actually costs about 1,450 pounds. That's right; the X25 isn't available stateside. Still, this sleek little number is a sexy representation of what Samsung could do if it entered the North American market.

Design-wise, the X25 is a road warrior's dream come true. It's housed in an attractive silver chassis with I/O in easy reach. USB 2.0, FireWire, Memory Stick and SD card readers, optical SPDIF output, S-Video, and headphone outputs make it easy to set up presentations. Moreover, Samsung's AV StationNow software makes it possible to watch DVDs and listen to music without loading Windows, which extends battery life. Samsung even incorporates some of its expertise in display technology with the DNIe (Digital Natural Image engine), a picture-enhancing technology borrowed from the latest generation of DLP televisions.

There's quite a bit of flexibility to be had in configuring an X25. You can choose from five different Pentium M processors; up to 2GB of DDR2-533 memory; three hard drive capacities up to 80GB; two different wireless cards; three LCD configurations; and a pair of discrete graphics chips, including ATI's Radeon X700 with 128MB of memory. A lofty price is the system's principle concession.

Dell Inspiron XPS2

Perhaps you would normally hesitate to buy the ultimate gaming machine from vanilla-bean Dell. Its second-generation XPS is an entirely different beast than the value-oriented configurations for which Dell is known, though. A fully featured Inspiron XPS2's spec sheet reads almost like a desktop computer. Add a 2.13GHz Pentium M, 1GB of DDR2-533 memory, a 100GB hard drive, and an NVIDIA GeForce Go 6800 Ultra controller with 256MB of RAM. The highest-end model even comes with a Sound Blaster Audigy 2 ZS PC Card. Dell throws in a dual-layer DVD burner and 802.11b/g wireless controller, too.

The exterior is designed to attract an edgier crowd. Dell's signature dull-grey plastic is replaced by jet black and aluminum. Vents on the front, top, and sides light up with one of 16 colors in true modder style. A widescreen 17-inch UXGA display comes standard. Just don't get overzealous with the 3D settings. Performance at the native 1,920 x 1,200 resolution will lag if you crank the anti-aliasing and anisotropic filtering.

If you're looking for just one standout feature on which to judge the XPS2 (starting at $2,337 at press time), check out the balance drawn between performance and mobility. At eight pounds it isn't exactly light, but Dell squeezes more than two hours of battery life from the system by virtue of its Centrino heritage. Not bad for a desktop replacement that slices through Doom 3.

HP L2000 SE

There are a couple of features unique to HP's L2000 SE (starting at $899). It's one of the first with an AMD Turion 64 processor inside, $50 from every unit sold goes to the Lance Armstrong Foundation for cancer research and awareness, and the system's other pertinent specs are solid.

A baseline L2000 comes with a 1.6GHz Turion, but you can upgrade up to the 2GHz model for an extra $125. The L2000 also includes 512MB of DDR memory, though upgrades are available to 2GB. HP offers a slew of hard drives, optical drives, battery options, and wireless networking upgrades. Surprisingly, however, the baseline configuration is comfortably equipped.

Rather than adapt a desktop chipset to serve notebook needs, HP adopted ATI's Radeon Xpress 200M with integrated X300 PCI-E graphics. Admittedly, most serious gamers will scoff at the core's performance, but the 350MHz engine is well suited for light-duty gaming and supports DirectX 9 titles.

Classifying the L2000 SE is no easy matter. At 5.4 pounds it's not thin and light, and the specs aren't quite sufficient for a desktop replacement. Call it what you will; HP's special edition L2000 packs plenty of punch, sells at a great price, and supports an even better cause. ▲

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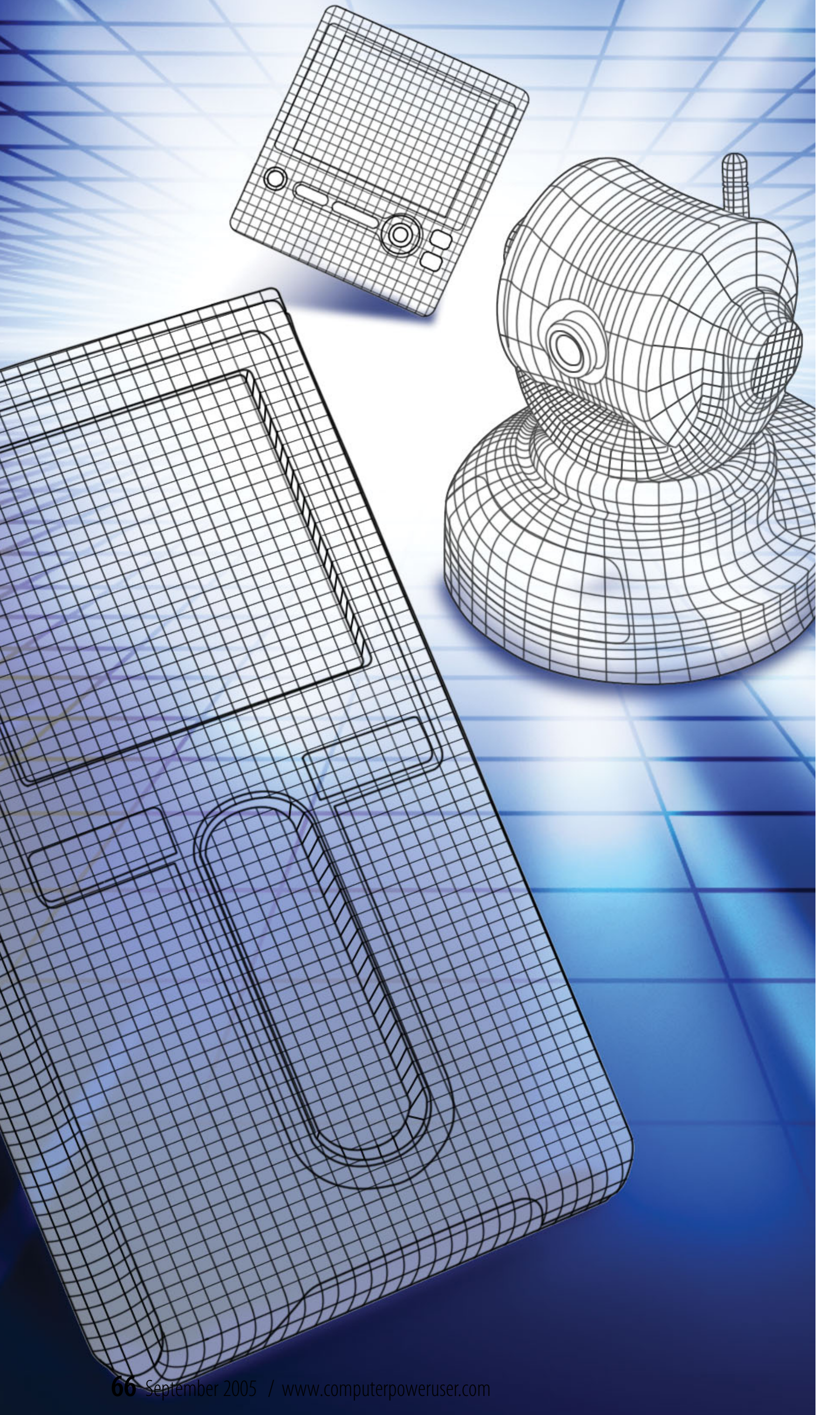
by Chris Angelini

Gear Gone Mobile

Cool Gadgets For The Mobile-Minded



Heading back to school? Off to a vacation? Or maybe work keeps you on the road. The fact is the world beyond your home base is a technological wasteland. Don't go out there unprepared. We rounded up some of today's most incredible gear for the mobile-minded, so grab a tissue for your drool. There's cool stuff up ahead.

Samsung YP-T7Z 512MB Flash Player

About the size of a mini box of raisins (2.46 x 1.47 x 0.58 inches [HxWxD]) and about 1.2 ounces), the YP-T7Z is a marvel of miniaturization. A 1.2-inch, 65,000-color screen does its best work by making navigation via the five-way joystick a snap. The player does rudimentary service as a JPEG viewer, but at 96 x 96, this is mostly an impressive novelty. Ditto for the text viewer function. FM reception and quality, however, is quite good, and Samsung's ability to scan and create an automatic presets list is a handy perk. FM recording is decent, as is line-in recording with the included patch cable and voice recording with the integrated mic thanks to bitrate options up to 192K. Along the right side are controls for Record, A-B looping, Play/Pause, and a Hold slider. The permanent Li-Ion battery is rated for 10 hours of runtime.

The glory here is the music playback. The player handles MP3, WMA (standard and secure), ASF, and OGG formats. The EQ presets are decent, but there's also SRS surround, WOW, and Tru-Bass effects on top of a seven-band user EQ. For a player this compact, the sound is excellent and remains largely distortion-free up to its moderately loud maximum volume.

YP-T7Z 512MB Flash Player
$149.99
Samsung
www.samsung.com

There are some drawbacks, though. As with the Samsung PMC, we experienced frequent stalls when synching with Windows Media Player 10. Samsung's bundled Media Studio software fixed this, but we soon ended up using My Computer for all transfers, which suits the player's folder-based filing system. Our unit also required resetting unless the USB cable was very firmly inserted. Annoyances aside, though, this is a great flash player with a sizzling feature set.

iRiver H10 20GB

iRiver's H10 offers a brilliant "best of" compilation of player features: 1.5-inch LCD (128 x 128) for JPEG and text viewing, a touch-sensitive navigation bar a la the Creative Zen Micro, a size similar to the iPod mini (4 x 2.4 x 0.85 inches and 5.8 ounces), Janus compatibility (for WMA-based subscription services), and 20GB capacity. FM radio and mic recording qualities mirror the Samsung player above.

With a 90dB SNR playing MP3s (60dB for FM radio), the H10's sound stays clear even into respectably loud ranges. The H10 also supports SRS WOW, many EQ presets, and a custom six-band EQ. The end result was crisp audio that excels in the mids and highs and delivers unusually good bass response. Navigation is intuitive, and iRiver manages to convey a lot of info in each screen without seeming cluttered.

Unlike the smaller capacity H10s, the Li-Ion battery is no longer removable. We prefer Creative's ability to select items by tapping the bar over iRiver's requirement to use Back and Select buttons. iRiver saves space by planting the line-in jack on the optional docking cradle ($40), and the USB cable is proprietary in order to accommodate the extra power needed for charging. More disturbing for audiobook lovers is this unit's insistence on sorting by the ID3 track title rather than the file name, which can really mess up your playback order if you're not careful.

The H10 is no iPod photo, but with MTP support and other hot points, it easily trumps the iPod mini along with most other subsized HD players on the market.

Samsung YH-999 20GB Portable Media Center

Weighing a trim eight ounces and measuring 4.21 x 3.82 x 0.83 inches, the YH-999's face is little more than a gorgeous 3.5-inch LCD, a slender row of control buttons, and a somewhat underpowered, tinny speaker. The device supports MP3, WMA, WMV, MPEG, AVI, ASF, WAV, MIDI, JPEG, and MS-DVR formats.

Video quality on the YH-999 is outstanding. Frame rates are smooth and solid, colors good, sharpness excellent, and we didn't observe any audio/video sync problems. We connected to the Napster To Go service and effortlessly tossed a torrent of tracks at the YH-999. (Video easily transferred in WMP10, but music was oddly more troublesome.) The unit's Achilles heel is audio fidelity. We think Samsung's stated 85dB SNR is optimistic because sound was distorted at higher volumes. Also, bass response was weaker than on the T7Z flash player, and there isn't custom EQ.

We can't ding Samsung for omitting PMP-style features, such as DivX support and video recording, because Microsoft's platform doesn't yet allow for such functionality. And, we'd give up an inch or two for longer runtime than the rated 12 hours of audio or three of video, especially if that entailed moving to swappable batteries. Samsung has done incredible things with the PMC platform here, but Microsoft's boundaries still keep top-end PMPs, such as Archos' AV series, looking attractive.

palmOne LifeDrive

This digital Swiss Army Knife sheds nearly all of Palm's old deficiencies. The 320 x 480 color LCD is sharp if not the brightest PDA screen we've seen, the silver styling is tastefully understated, and the Intel 416MHz XScale keeps apps generally working and switching quickly. We love the handy screen rotation button and having both Wi-Fi and Bluetooth onboard.

The LifeDrive's key attribute is its 4GB Microdrive; its key detriment is the toll this hard drive takes on the nonswappable Li-Ion battery. We used the LifeDrive Manager app to convert a full-length DivX movie to MPEG-4 (18fps) and ran the movie with all wireless functions disabled, yielding a three-hour runtime almost on the nose.

Unlike the Pocket PC, the Palm platform still requires you to press a button on the data cable/cradle to start a HotSync. Hooking into our wireless LAN was a snap and reception was very good. Interestingly the LifeDrive defaults to timing out the wireless module after three minutes. You can modify this up to 15 minutes, but there

H10 20GB
$299.99
iRiver
www.iriver.com
CPU CPU CPU CPU

YH-999 20GB Portable Media Center
$499.99
Samsung
www.samsung.com
CPU CPU CPU C

LifeDrive
$499
palmOne
www.palmone.com
CPU CPU CPU CPU

CoPilot Live | Smartphone (Bluetooth GPS)
$349
ALK Technologies
www.alk.com

BT800 Bluetooth Headset
$149.99
Jabra
www.jabra.com

is no timeout disable option. Overall, palmOne opts for the safest, most common preference options rather than giving users leeway to screw up their PDA.

The included Pocket Tunes player is a worthy basic jukebox with which you can create on-the-fly playlists and stream live radio from Rhapsody, but the normally clean audio pops terribly with every tap or button push, and playback hiccups and stalls if you try to multitask. But, slideshow assembly is ultra-simple, and the ability to transfer photos from your camera to the LifeDrive means no more hauling around a notebook in the field. In other ways, the LifeDrive is much like the more recent Tungstens in its connectivity and productivity. Being able to slip into Drive Mode and use the PDA as a USB drive is cool, but having to use the proprietary data cable is not. Overall, this 4.76 x 2.87 x 0.74-inch, 6.8-ounce palm-One unit is a jewel needing only minor polishing.

ALK Technologies CoPilot Live | Smartphone (Bluetooth GPS)

Who would've thought that a phone could outclass a PDA when it comes to GPS? Tapping in destination info is only a bit harder by keypad than on-screen keyboard, and ALK did a great job of getting us to destinations with less confusion. Spoken guidance defaults to distances of two, one, three-tenths of a mile, and "just ahead." There are plenty of view options, including 3D, north up or heading up, RV and walking modes, you can use to customize the main display's text info, and ALK's software keeps the backlight on with GPS use. ALK's point-of-interest guidance is surprisingly good, and acquisition time is fast and consistent.

Hardware pairing was a cinch, but software installation and configuration is this kit's weakness. Microsoft is primarily to blame because ActiveSync will only install the CoPilot program, not the routes you plan. In fact, you have to select and download the map data that goes into your phone with the desktop app and then manually copy it to the right folder in the phone or its storage card. You can also transfer route plans this way, but it's a pain. As such, we found CoPilot Live | Smartphone to be great for simple trips but not so much for multistop jaunts. Also, guiding the on-screen crosshair selector to map items can be cumbersome.

Jabra BT800 Bluetooth Headset

The BT800 is the state of the art in Bluetooth headset functionality thanks to its 12 x 2 character backlit LCD display. This opens the door to call list viewing and redialing, caller ID, and a robust menu system you can navigate with a jog dial.

Praises to Jabra for introducing a recessed pairing button, and vibrate mode is a notable addition. Voice quality both in listening and speaking is outstanding thanks to DSP processing, which also made voice dialing from the phone's contacts a breeze. We also noticed far fewer errors when navigating speech recognition-based voicemail systems than with most Bluetooth headsets, which is doubly impressive since the BT800 is a boomless model.

Once you get the BT800 twisted just so, it's fairly comfortable for long-term wear due to its feathery 0.8-ounce weight, but we prefer Jabra's traditional behind-the-ear gel designs. The BT800 is neither ugly nor attractive. We'd like it to be a bit slimmer than one inch, but overall, this is an excellent quality, innovative headset.

D-Link DCS-5300G Wireless Internet Camera

Ultimately, $400 (street) is amply fair for what D-Link offers in this wired/wireless IP camera. The 5300G requires access to an AC outlet, but you can now shed dependence on wired LAN connections and send color video at up to 30fps (320 x 240) or 10fps at VGA resolution over 802.11g. Additionally, the 5300G captures and sends audio at 24Kbps with its omnidirectional integrated mic. Also, the 5300G has a 270-degree motorized panning range, a 90-degree tilt, and digital zoom up to 4X.

What makes this rig a killer is D-Link's ability to control up to 16 cameras from one PC with its IP Surveillance software. You can display thumbnails of all 16 on the screen at once, let one camera view fill the screen, or pick a grid of some number of cameras in between. All logins to a camera will prompt a username/password, so you can monitor your space and intruders can't.

Two warnings: The camera doesn't do well in low light conditions. Also, upon finishing the initial setup, make sure you select

DCS-5300G Wireless Internet Camera
$549
D-Link
www.dlink.com

Bag It!

Now that you're brimming with gadgets, you'll need some way to transport all that mobile gear.

Action II Rolling Backpack XL
$59.95
Pacific Design
www.pacificdesign.com

Action II Rolling Backpack XL

The Rolling Backpack XL is nearly self-explanatory. It's able to accommodate most units with 17-inch displays, features padded shoulder and waist straps that detach and/or hide in pockets, and has wheels. The Rolling Backpack sports plenty of pouches and pockets, is reasonably attractive, and seems plenty durable. We took the unit on an overnight trip and found it could hold rolled up clothes, a 17-inch ASUS W1N, two media players, a PDA, and enough cabling and peripherals to keep airport security entertained.

The Rolling Backpack's problem is that it's made for trim people of medium height. The bag weighs 6.8 pounds when empty. It's a great way to travel provided you have the right physique.

Global Executive Backpack
$89.99
Targus
www.targus.com

Global Executive Backpack

Without wheels and smaller, the Global Executive looks humbler than the Action II, but once you pick it up, the Targus advantage is obvious. The materials are thicker and more durable looking and the design details are generally smarter.

The pockets are better suited to tech travel, with two padded inner gadget pockets and a cell phone case that snaps onto a shoulder strap. We like the other extras, too, such as the stiff holding board for passports, airline tickets, or CD/DVDs and the blue LED flashlight on a retractable cord. Lumbar support is thick and breathable, and the straps adjust comfortably. But, we wish Targus had built this to fit 17-inch notebooks instead of up to 15.4-inch designs. ▲

X6HR
$475.99
Suunto
www.suunto.com

2GB Voyager
$139
Corsair
www.corsairmemory.com

the option *not* to "reset the IP address at the next boot," so your browser bookmarks and IP Surveillance settings work.

D-Link loads on the extras. You can click and drag to establish areas to monitor or exclude from motion monitoring. Within a field of view, you can have up to 24 security points and instruct the camera to cycle through these in the order you specify. If motion in a monitored region sets off an alarm, you can have email alerts sent while the video is recorded in AVI format. Alternatively, you can tap into what the camera sees by opening the proper port in your router and watch footage as a live MPEG-4 stream. A security I/O port in the back for tying in industry standard infrared, magnetic strip, and other trip switch devices and an update will be coming soon to let D-Link DSM-320 Media Players pipe live camera footage to your TV. Too cool.

Suunto X6HR

Athletic gearheads, your dream gadget has arrived. If you're into anything involving altitude change—hiking, biking, skiing, etc.—the X6HR is your ticket to precision training. The core function here is charting your heart rate (a heart rate transmitter belt is included) and altitude in 2-, 10-, or 60-second increments. The watch stores this info and passes it over to the SAM (Suunto Activity Manager) app running on your PC, which then archives your exercise logs, charts the data, and helps you analyze the information.

But the X6HR is also an altimeter, clinometer, barometer, thermometer, digital compass, chronograph, timer, triple alarm, and dual time watch. Despite all the functions, Suunto keeps the interface reasonably navigable even cluing you into how deep in subfunctions you are. Considering all this, the watch is respectably compact. The mineral glass protecting the LCD is a bit bulbous, but it's also virtually scratch-proof and water resistant.

The HR model of the X6 we received has a composite rubber wrist strap. The edges of the underside are raised, presumably to allow for airflow under the strap, but we found this a bit uncomfortable over prolonged use. Also, who in this century designs a $475 computing device with a serial cable? Try USB, Suunto. Otherwise, the X6HR is stunning.

Corsair 2GB Voyager

By now, chances are good you've dabbled with USB flash drives, and Corsair's 2GB Voyager is the finest flash drive on the market today. The thickly rubberized exterior is both stylish and tough, although Corsair's URL on the back cheapens it a bit, and we wish there were a way to attach the removable cap to the drive's body.

Corsair promises sustained read speeds of 19Mbps and write speeds of 13Mbps. To test this, we snagged the 500MB folder filled with small files, copied it to the Voyager, then read it back out. The drive completed the write in 5:51 (minutes:seconds; 11.4Mbps) and read back in 2:27 (27Mbps). We then ran the same test on our 512MB SanDisk Cruzer Titanium and pulled speeds of 5.82Mbps and 27.2Mbps, respectively, showing that while read times are both practically identical and way above spec, the Voyager blows the former leader off the map on write times. The 10-year warranty and bundled hidden partition utility are almost afterthoughts. ▲

by William Van Winkle

For three pages of bonus gear, go to www.cpumag/cpusep05/gear

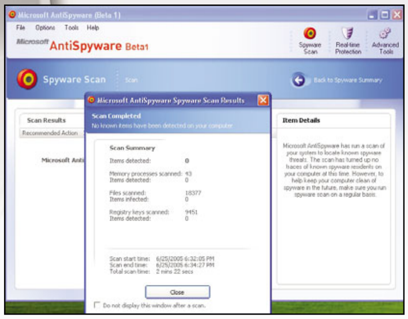
The Bleeding Edge Of Software

by Warren Ernst

Inside The World Of Betas

Send Us Your Betas: Know of software in the beta stage that's deserving of some attention? Let us know. We'll take a look at it and possibly give it a go-round. Send your prospects to bleedingedge@cpumag.com.

Microsoft Windows AntiSpyware Beta 1



Scan Completed
No known items have been detected on your computer

Scan Summary
Items detected: 0
Memory processes scanned: 43
Items detected: 0
Files scanned: 18377
Items infected: 0
Registry keys scanned: 9451
Items detected: 0

Scan start time: 6/25/2005 6:32:05 PM
Scan end time: 6/25/2005 6:34:27 PM
Total scan time: 2 mins 22 secs

☐ Do not display this window after a scan.

Microsoft AntiSpyware has run a scan of your system to locate known spyware threats. The scan has turned up no traces of known spyware residents on your computer at this time. However, to help keep your computer clean of spyware in the future, make sure you run spyware scan on a regular basis.

Official product name: Microsoft Windows AntiSpyware
Version # previewed: Beta 1
Publisher: Microsoft
Developer and URL: Microsoft; www.microsoft.com
ETA: Q4 2005
Why you should care: Sometimes Microsoft hits a home run. This is one of those times.

No one generates as many mixed feelings among expert users as Microsoft. The Windows AntiSpyware tool is no exception. We all know about Windows' security issues, which spyware can take advantage of, so you would certainly be within your rights to be upset that MS doesn't just *fix* Windows instead of buying and branding GIANT's top-notch antispyware product and making it available free to registered Windows users. But AS is so strong, even in beta, it's hard to hold onto that anger.

In foreground scans, AS is as effective (and sometimes more so) as other free tools out there. Its extras, however, blow the competition away. For example, in foreground scans there is a useful and entirely functional rollback feature if software stops working after removing spyware.

The app's clean, elegant UI has a bevy of tools suitable for beginners and experts, including a HiJackThis-like browser object lister and remover, a browser default settings changer, and a cookie/tracker cleaner. All these provide enough information and flexibility to give experts real options, while the defaults and help system let beginners solve problems reasonably well, too.

In other ways, AS feels like a top-notch antivirus product; it downloads updates automatically or on a schedule, has a background scanner that monitors executables and common spyware entry points, and an online component that compares antispyware notes with other users via an online database to quickly recognize new threats. Pundits claim that MS gets things right about 85% of the time. Consider AS one of those times. ▲

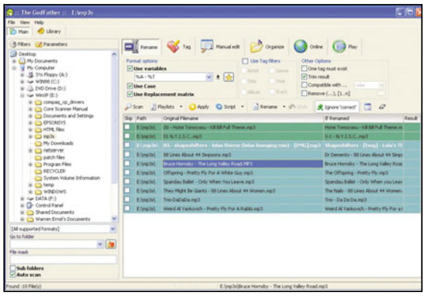
The GodFather 0.70 Beta 3

There's something to be said for a program so stuffed with functionality that the UI is a little confusing at first. Once you figure it out, though, the app can generally do anything you want. Such is the case with The GodFather, a free MP3 (and other audio format) organizer/renamer/player/tagger/playlist creator.

Dimitris Touzozoglou, GodFather's author, makes no bones about the app's complexity, but he initially wrote it for his own audio library. He later thought his friends might like it, so he released it. The program can be tough to wrap your head around, but there are numerous third-party tutorials at The GodFather site to check out for help.

What does The GodFather do? Everything, of course, including correct or add to ID3 tags in music files, rename files based on tags, add/remove variables (such as track numbers or album names) to filenames, create organization and file structure to MP3s in a single directory, automatically build playlists based on song attributes, and more.

In addition to the full GUI, there's a built-in PASCAL-like scripting language and a cadre of helpful users in The GodFather's forums to help get started. Scripts range from bulk renaming to grabbing artist and album information from various sites. Though still in beta, I couldn't find anything that screamed "unfinished." The GodFather seems ready for prime time. ▲



Official product name: The GodFather
Version # previewed: 0.70 Beta 3
Publisher: Dimitris Touzozoglou
Developer and URL: Dimitris Touzozoglou; users.otenet.gr/~jtcliper/tgf
ETA: Q3 2005
Why you should care: Absolute power in tagging/renaming MP3s with the complexity any geek should love.

UP TO SPEED

Upgrades That'll Keep You Humming Along

This month, NVIDIA offers up new software for motherboards and graphics cards, and AOL slips us a peek of its upcoming browser. Numerous vendors have also issued upgrades for compatibility with dual-core CPUs and Windows XP Professional x64.

Upgrades

Alcohol 120% 1.9.5.3105

The virtual CD/DVD drive software adds speed and buffering fixes for making image files, improves the read/write engines, updates the help file, and adds support for some special ISO image file formats.

Get it at: www.alcohol-software.com

AOL Explorer 1.0.4234.1025 Beta

This update of the former AOL Browser lets you import AOL Favorites, adds a search input field, optimizes startup speed, and responds to mistyped URLs with recommendations.

Get it at: beta.aol.com/projects/aolexplorer

Fraps 2.6.2

Fraps measures frame rates in most Direct-X titles and captures video of in-game play. Recent updates lets users set the video capture frame rates and grab video from 64-bit code in WinXP Pro x64.

Get it at: www.fraps.com

iPodder 2.1

iPodder now lets you subscribe to a podcast with one click, includes auto cleanup of outdated podcasts, and adds nearly a dozen new languages and context menu options, such as opening the downloads folder. A 2.0 release for Linux is also available.

Get it at: ipodder.sourceforge.net

Kaspersky Anti-Virus Version 5.5

This version is specifically for Linux, FreeBSD, and OpenBSD workstation mail and file servers. It now includes iChecker (previously available only for Windows), which decreases system loads, and improved administration tools for easier network installations.

Get it at: www.kaspersky.com

K-Lite Codec Pack 2.50

These codecs update most of the important codecs with the latest versions of ffdshow, AC3 ACM, and MP4 DirectShow splitter.

Get it at: www.codecguide.com

Microsoft Baseline Security Analyzer 2.0

MBSA scans systems for security holes and needed fixes. The upgrade supports WinXP Embedded Edition and WinXP Pro x64, improves Windows component support, and offers easier security management.

Get it at: www.microsoft.com

Nero CD-DVD Speed 4.00

This benchmark and diagnostic tool for optical drives upgrades the UI and adds customizable graphs for various transfer, CPU, and drive tests.

Get it at: www.cdspeed2000.com

Sandra 2005 SR2

The diagnostics and benchmarking tool gets a service release for more direct support of recent hardware and software, including WinXP Pro x64, dual-core AMD/Intel chipsets, and recent motherboard chipsets from the top manufacturers. This release is also digitally signed for security.

Get it at: www.sisoftware.net

Skype 1.3.0.55

Recent changes to the VoIP service include bug fixes to identify more accurately who's online, send chat messages more reliably, and display country/region data more clearly in advanced Search mode.

Get it at: www.skype.com

Windows 2000 SP4 Rollup 1

This update bundles recent critical and recommended security updates for the latest version of Win2000.

Get it at: www.microsoft.com

Zoom Player 4.50 Final

Zoom now handles Windows WMV files with DRM level 2000 content. A new UI allows for improved search and file management and better docking of playlist, equalizer, and main windows, and there's new file format support.

Get it at: www.inmatrix.com

Driver Bay

ForceWare 77.72

The new unified drivers improve SLI performance and validation of recent games and add compatibility with dual-core AMD and Intel CPUs. TurboCach performance is improved, and DirectX 9c and OpenGL 2.0 are supported. An HDTV Setup Wizard and HDTV underscan control help optimize output to HDTVs.

Get it at: www.nvidia.com

iPod Updater 2005-06-26

The updater includes the latest respective versions for color, Click Wheel, and mini models. This version lets iPods integrate with iTunes 4.9 for podcast downloading.

Get it at: www.apple.com

Logitech SetPoint 2.40 build 855

These are the latest, most compatible drivers for most recent Logitech mice and keyboards. A GameSetting tab lets a mouse detect when a game is loaded and retain current SetPoint assignments, create custom game assignments, or revert to default Windows mouse settings.

Get it at: www.logitech.com

nForce 4 SLI Intel Edition

For WinXP/2000/x64, this WHQL-certified suite of motherboard drivers fixes multiple compatibility issues and includes the latest audio, LAN, RAID, and IDE drivers and their respective management tools.

Get it at: www.nvidia.com

by Steve Smith

Essential Notebook Apps

For Those Times You're Away From Home

When you get a new laptop, you're sure to load it with the same software you use on your desktop PC: an office suite, your favorite Web browser, work-related applications, and perhaps a game or two. But a notebook isn't a desktop. The mobility aspect brings with it both positive features and issues to contend with, including battery power, wireless Internet access, and new security worries. That's why applications that you never needed or considered for your desktop PC will make your portable computer shine. I rounded up 10 essential programs that can help make your portable computing experience more productive and easier, plus add some fun.

by Kevin Savetz

Bartels Media MaxiVista 2

When you're at home at work on your desktop PC, don't let the laptop sit idle in its cushy case. MaxiVista is a clever program that turns your laptop's screen into a second monitor for your PC. You just network the two machines via TCP/IP (Ethernet, a wireless LAN, or FireWire will do), install software on both PCs, and voila, the desktop thinks it has two screens. (And if it already has two, it will have three.)

We reviewed MaxiVista 1 for the September 2004 issue (page 75). This version features a lower price, improves video playback on the secondary screen, and supports additional monitor configurations. The new Professional and Mirror Pro versions ($40 and $50, respectively) let you get fancy by creating a giant Desktop space with up to four computers or let you control four PCs with one keyboard and mouse through what is essentially a software KVM switch. You can try the MaxiVista 2 free for 15 days.

Cyberlink PowerDVD 6

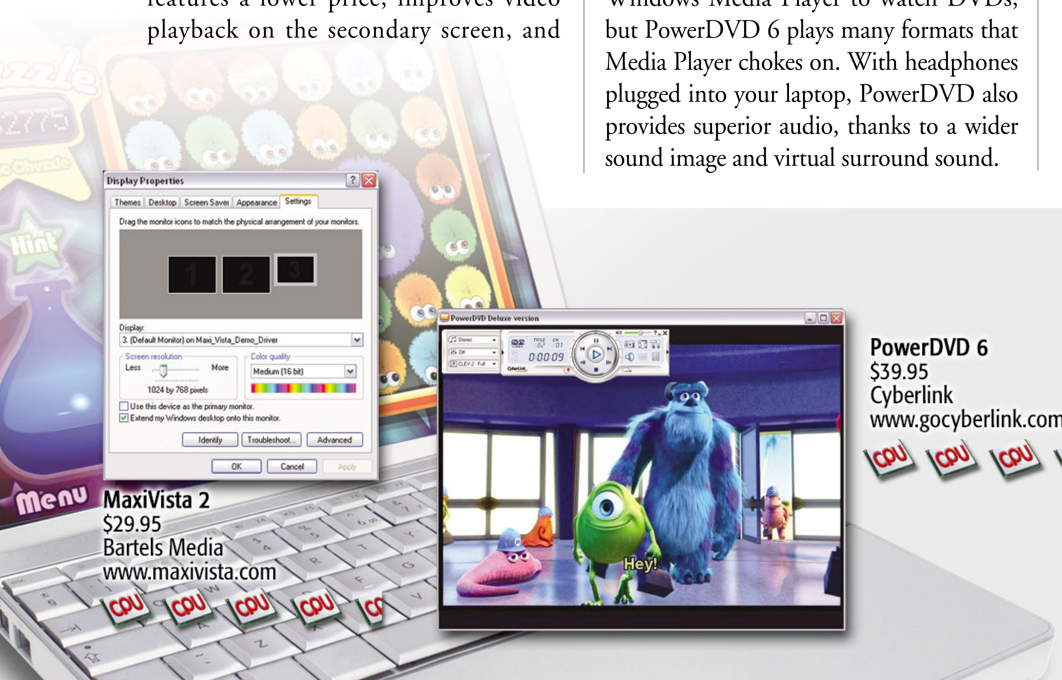
No notebook is complete without an app for watching movies. Yes, you use Windows Media Player to watch DVDs, but PowerDVD 6 plays many formats that Media Player chokes on. With headphones plugged into your laptop, PowerDVD also provides superior audio, thanks to a wider sound image and virtual surround sound.

When you download your movies and TV shows to your notebook to watch with PowerDVD, you never know which of a multitude of codecs they might be encoded in. It's a good bet you'll need DivX (see our review of the latest version on page 78) and XviD for videos. For those times when you find yourself with a media file that seems to use some other codec, download GSpot Codec Information Appliance (free; gspot.headbands.com), which figures out which audio/video codecs an AVI file requires to play and tells you the codes that are already installed on your system.

Fanix Software As-U-Type 3.1

Tapping away on those little laptop keys can lead to lots of typos. As-U-Type checks your spelling as you type, learns the spelling mistakes you make, and (if you choose) can automatically correct them. In the simplest mode, the app highlights incorrectly spelled words. The program really shines in automatic correction mode, where it remembers that you spelled "sincerely" wrong before and corrects the word when you do it again. As-U-Type works in most applications, providing easy access to a spell checker in your presentation manager, HTML editor, and email program.

The program also works as a macro tool, letting you create keyboard shortcuts. For example, typing a shortcut will automatically paste in whatever text you want, up to 20 pages. The program also gives you multiple clipboards, which can be big time-savers. If you don't need macros or multiple clipboards, a version of the app called As-U-Type Speller will do the spell checking for $20 less than the



Drag the monitor icons to match the physical arrangement of your monitors.

Display:
3. (Default Monitor) on Maxi_Vista_Demo_Driver

Screen resolution: 1024 by 768 pixels

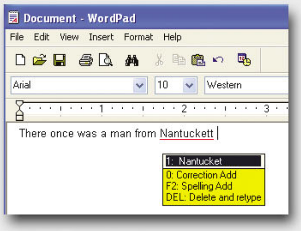
Color quality: Medium (16 bit)

☐ Use this device as the primary monitor.

☑ Extend my Windows desktop onto this monitor.

MaxiVista 2
$29.95
Bartels Media
www.maxivista.com

PowerDVD 6
$39.95
Cyberlink
www.gocyberlink.com



There once was a man from Nantuckett

1: Nantucket
0: Correction Add
F2: Spelling Add
DEL: Delete and retype

As-U-Type 3.1
$49.95
Fanix Software
www.asutype.com

full edition. Free trials of both versions are available for download.

Han-soft Internet Secure Tunneling 1.5

If you use an email client to send and receive messages using public wireless networks, it's vital to set up secure tunneling, otherwise your email password (and your mail) will be visible to anyone and everyone on that network. By setting up a secure tunnel, your email and, optionally, other data you send and receive, such as database connections, is encrypted.

Although creating a secure tunnel is essential, it isn't always easy. Internet Secure Tunneling makes the process significantly easier than doing it without the app. We said "easier," not "easy." Our main qualm with the program is with its sparse documentation. Still, spending a few minutes figuring out tunneling beats having strangers spy on your email.

NetStumbler.com NetStumbler 0.4.0

Traveling with a laptop often means searching for and connecting to public Wi-Fi networks that you aren't familiar with. NetStumbler helps discover wireless networks and determine their signal strength, channel, and speed. In addition, the program can detect unsecured wireless networks. When it finds a network—for instance, when you drive by a coffee shop with free Internet access—it beeps, so you can pull over and check your email. When you're at a conference center or hotel with multiple access points, the program will show them all, so you can use the one with the strongest connection at your location.

On the road NetStumbler has been known to be used by some for wardriving; combined with a GPS receiver, the software will log the names and locations of wireless networks. Back at home NetStumbler can help tune your own wireless network by finding areas with poor coverage and detecting nearby networks that may be interfering with yours.

PassMark Software BatteryMon 2.0

Is your laptop's battery working as well as it should or as well as it used to? Over time batteries can lose their ability to hold a charge. If you think your notebook's battery has lost its gusto, BatteryMon will tell you for sure. The program monitors the performance of a notebook's battery, graphing its charge level as you use the computer. It can send an email when the charge reaches a certain mark and stop the system from sleeping if you want the battery to run down completely.

BatteryMon will also tell you vital stats about your battery, including its chemistry, capacity, voltage, and temperature. These

PDA Must-Haves

You don't have to cart your laptop around everywhere; PDAs let you do more with less. Here are a few picks for essential PDA software.

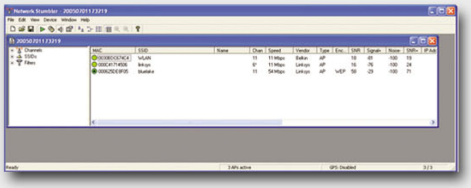
For Palm OS. Documents To Go Premium Edition 7 ($49; www.dataviz.com) lets you access a wide variety of documents on your Palm OS PDA. With it you can view and edit Word, Excel, and PowerPoint documents and have access to basic word processing features, including spell checking and word counts. You can also view images and some PDF files. When you're back at the PC, the app will automatically synchronize your files with those on the computer. The package also includes Bachmann Software's FilePoint Wireless Edition, which lets you wirelessly retrieve documents from a shared desktop or network folder.

MMPlayer ($17.95; www.mmplayer.com) is an audio and video player for Palm handhelds that plays MP3, WAV, DivX, and other formats, so you can load your Palm up with tunes or even a full-length movie. The Web site includes instructions for encoding video to squeeze a movie onto a 128MB flash card.

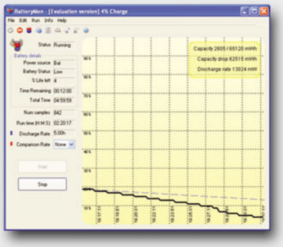
For Pocket PC. If your Pocket PC's built-in Contacts, Calendar, and Tasks applications aren't as useful as they should be, check out PocketInformant 2005 2.1 ($29.95; www.pocketinformant.com). The program offers five customizable calendar views plus contacts, tasks, and notes. It also supports recurring tasks, lets you color-code events, and more.

Take your tunes on the road with PocketMusic (free; www.pocketmind.com), a freeware MP3 player. You can change the look of the program using Winamp skins. (There are about a billion to choose from.) The $19.95 Player Bundle adds the ability to play Ogg Vorbis, Audible, and streaming audio files. ▲

Internet Secure Tunneling 1.5
$15.99
Han-soft
www.han-soft.com
CPU CPU CPU



NetStumbler 0.4.0
Free
NetStumbler.com
www.netstumbler.com
CPU CPU CPU CP



BatteryMon 2.0
$24
PassMark Software
www.passmark.com
CPU CPU CPU CP

PopCap Games
Free to $20
PopCap Games
www.popcap.com
CPU CPU CPU CPU

stats can be useful for verifying that a cheap aftermarket battery meets the specs the manufacturer promises.

PopCap Games

Your laptop can be a great source of entertainment on an airplane, in a hotel room, or wherever your travels take you. If you've drained every last morsel of enjoyment out of Solitaire and Minesweeper, head to PopCap Games for some fun, easy-to-learn games. If you're killing time somewhere with an Internet connection, you can play 24 free, Web-based games at the site. These include puzzle, card, arcade, and word games. Favorites include Bookworm, a Boggle-like word-find game; Bejeweled, a colorful tile-matching game; and the addicting Chuzzle.

For offline fun you can download deluxe versions of 20 games (primarily for Windows, Palm, and PocketPC, with some for Mac OS X). These apps are each $20 after a free trial. Most are feature-laden versions of the online games with extra levels and better graphics. No matter what type of game you like, you're sure to find something amusing, and it's better than staring at the arrival monitors at the airport (and certainly more fun than Solitaire).

Steganos Safe 8

If your notebook is stolen, insurance can reimburse you for the replacement cost of the hardware. (Safeware specializes in computer insurance and offers instant online quotes.) For most business users, however, the data on the laptop—spreadsheets, business contracts, and more—is more valuable than the hardware itself.

Steganos Safe can keep your private data out of strangers' hands. The program creates an encrypted virtual hard drive (up to 64GB using 256-bit AES), so your data is nothing but encrypted gibberish to anyone who doesn't know the password. When you provide the password, the data is decrypted and as accessible as regular files. If you'd don't want to have to remember another password, the program can unlock files when you insert a USB key or when your Bluetooth mobile phone is in proximity of the computer. (These are interesting ideas, but they mean your data is only as secure as your USB key or phone; we'll stick with a password.) The program also includes a secure file-wiping utility, so information you delete can't be recovered.

TGRMN Software ViceVersa Pro 1.3.1

Sometimes you work on a notebook; sometimes you work on a desktop PC. ViceVersa can synchronize the data between the two PCs to assure that the documents you take on the road are the latest and greatest versions. You can set the app to check for changed files on a schedule (once a day, for example) or continuously monitor files on both computers for changes.

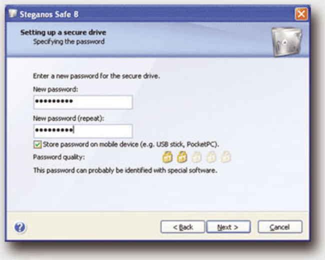
The software doubles as a backup tool; it can copy your laptop's files to an external hard drive, removable media, or another PC on the network. ViceVersa can also retain several versions of each file, so you can revert to an old version if necessary. A Plus version is available for $30.

TopoGrafix ExpertGPS 1.3.7

If you use a GPS receiver, chances are it quietly creates track logs as you travel about where you've been and how fast you were traveling. By itself that data isn't much fun, but combine it with ExpertGPS' mapping software, and you can do some cool stuff. ExpertGPS will overlay your tracks on top of aerial photos or topographic maps, which it downloads automatically. Feed it GPS track logs, and you can literally see where you've been. You can also take the laptop in the car for a real-time moving map.

ExpertGPS also lets you draw a planned route on a map to show you nearby features and lets you download those as waypoints to your GPS receiver. You can also scan your own maps and calibrate the software to work with them.

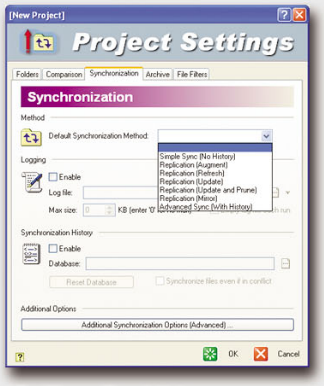
Getting started with ExpertGPS is a bit tricky, and the documentation could be clearer. I had to switch my GPS receiver between Garmin and NMEA output modes to perform different functions, plus restart the program to get it to recognize the change. Despite these difficulties ExpertGPS is a fun way to get more use from your GPS receiver. ▲



Setting up a secure drive
Specifying the password

Enter a new password for the secure drive.
New password: ••••••••••
New password (repeat): ••••••••••
☑ Store password on mobile device (e.g. USB stick, PocketPC).
Password quality:
This password can probably be identified with special software.

Safe 8
$35.95
Steganos
www.steganos.com



Synchronization

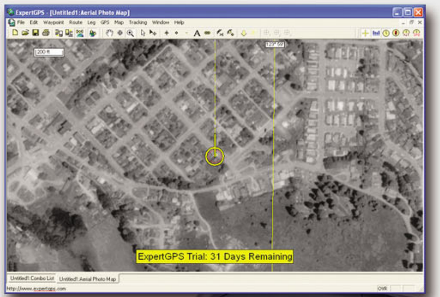
Method
Default Synchronization Method:
Simple Sync (No History)
Replication (Augment)
Replication (Refresh)
Replication (Update)
Replication (Update and Prune)
Replication (Mirror)
Advanced Sync (With History)

Logging
☐ Enable
Log file:
Max size: 0 KB (enter '0'

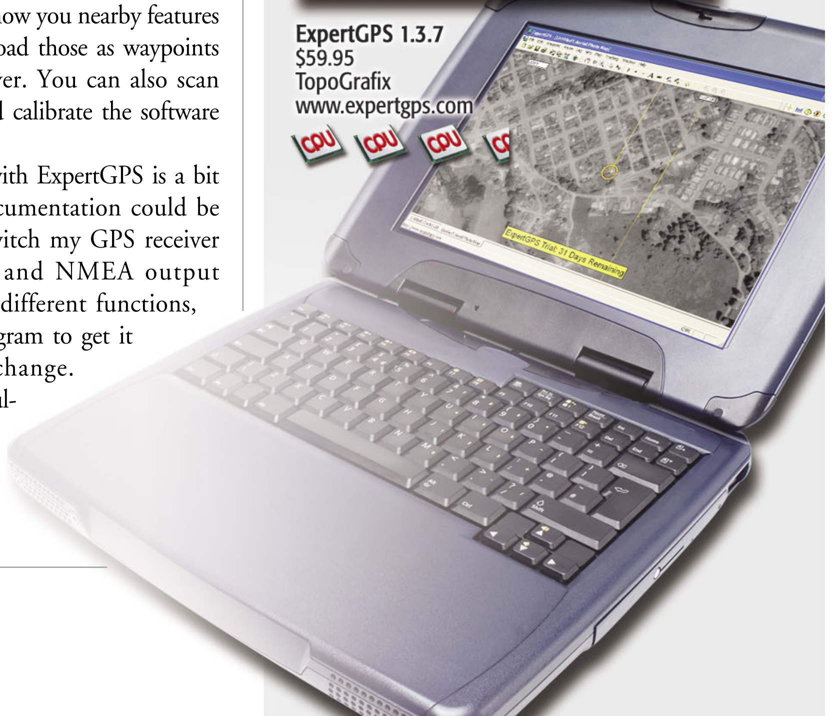
Synchronization History
☐ Enable
Database:
Reset Database
☐ Synchronize files even if in conflict

Additional Options
Additional Synchronization Options (Advanced) ...

ViceVersa Pro 1.3.1
$59.95
TGRMN Software
www.tgrmn.com

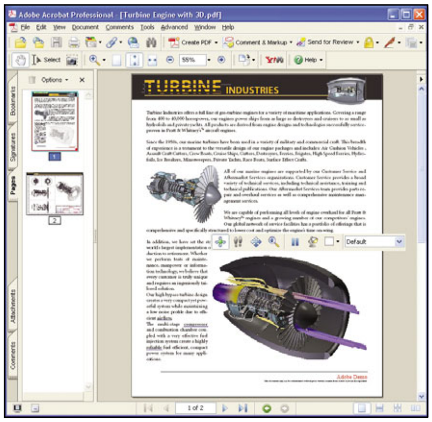


ExpertGPS 1.3.7
$59.95
TopoGrafix
www.expertgps.com



by Warren Ernst

Adobe Acrobat 7 Professional



- **Acrobat 7 Professional**
- $449
- Adobe
- www.adobe.com

With several low-cost and free products that create PDF files on their own, Acrobat 7 Professional's $449 asking price may have you wondering what could possibly be worth this premium. (The Standard version is $299.) To answer this legitimate question, you must consider your PDF needs. If your PDF files are just basic conversions of Microsoft Office files, free options such as OpenOffice.org make sense. However, if you create and manage dozens (or thousands) of PDF files with sources ranging from scans to AutoCAD 3D objects and you need feedback from multitudes of readers, Acrobat 7 Pro has never been so worthwhile.

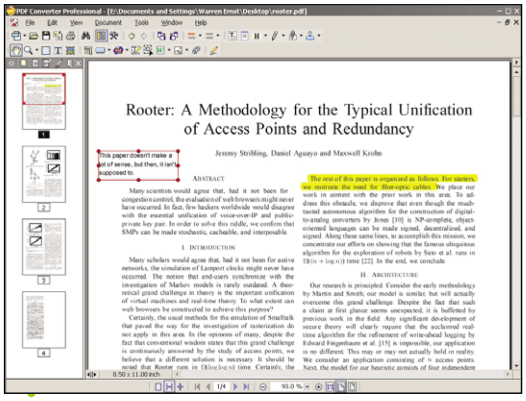
Acrobat 7 Pro is less annoying than its predecessors and loads and runs much faster, despite consuming hundreds of megabytes of drive space. You can now disable the MS Office toolbars, and they remain disabled. Grabbing images from a scanner to create multipage PDF files has gone from being torturous to a one-click job. The recipients of your PDF files can generate feedback and annotations with the standard Acrobat 7 Reader, which dramatically increases your "request for feedback" response rate. Bravo.

There are also usability improvements. Acrobat can generate PDF data from Visio charts and constructs and lets readers manipulate 3D AutoCAD-based objects directly within the PDF. A new The Organizer module provides easy access to all the PDFs that you've created or read within the past year and makes combining smaller documents into a larger one a snap.

A bundled PDF form creator, LifeCycle Designer 7, makes creating forms simple. After importing a PDF file or selecting from more than 50 templates, you can create electronic forms that recipients can fill out electronically. Return data can arrive in XML form within an email, which Acrobat 7 can import and convert into a CSV file with just a few clicks.

Acrobat 7 Pro gives you a lot of power for your money, which not everyone needs. If you do there's never been a better Acrobat. ▲

ScanSoft PDF Converter Professional 3


PDF Converter Professional - [E:\Documents and Settings\Warren Ernst\Desktop\rooter.pdf]
File Edit View Document Tools Window Help
1
2
3
4
8.50 x 11.00 inch
1/4
93.0 %

Rooter: A Methodology for the Typical Unification of Access Points and Redundancy

Jeremy Stribling, Daniel Aguayo and Maxwell Krohn

This paper doesn't make a lot of sense, but then, it isn't supposed to.

ABSTRACT

Many scientists would agree that, had it not been for congestion control, the evaluation of web browsers might never have occurred. In fact, few hackers worldwide would disagree with the essential unification of voice-over-IP and public-private key pair. In order to solve this riddle, we confirm that SMPs can be made stochastic, cacheable, and interposable.

I. INTRODUCTION

Many scholars would agree that, had it not been for active networks, the simulation of Lamport clocks might never have occurred. The notion that end-users synchronize with the investigation of Markov models is rarely outdated. A theoretical grand challenge in theory is the important unification of virtual machines and real-time theory. To what extent can web browsers be constructed to achieve this purpose?

Certainly, the usual methods for the emulation of Smalltalk that paved the way for the investigation of rasterization do not apply in this area. In the opinions of many, despite the fact that conventional wisdom states that this grand challenge is continuously answered by the study of access points, we believe that a different solution is necessary. It should be noted that Rooter runs in $\Omega(\log \log n)$ time. Certainly, the

The rest of this paper is organized as follows. For starters, we motivate the need for fiber-optic cables. We place our work in context with the prior work in this area. To address this obstacle, we disprove that even though the much-tauted autonomous algorithm for the construction of digital-to-analog converters by Jones [10] is NP-complete, object-oriented languages can be made signed, decentralized, and signed. Along these same lines, to accomplish this mission, we concentrate our efforts on showing that the famous ubiquitous algorithm for the exploration of robots by Sato et al. runs in $\Omega((n + \log n))$ time [22]. In the end, we conclude.

II. ARCHITECTURE

Our research is principled. Consider the early methodology by Martin and Smith; our model is similar, but will actually overcome this grand challenge. Despite the fact that such a claim at first glance seems unexpected, it is buffetted by previous work in the field. Any significant development of secure theory will clearly require that the acclaimed real-time algorithm for the refinement of write-ahead logging by Edward Feigenbaum et al. [15] is impossible; our application is no different. This may or may not actually hold in reality. We consider an application consisting of n access points. Next, the model for our heuristic consists of four independent

- **PDF Converter Professional 3**
- $99.99
- ScanSoft
- www.scansoft.com

Just because Adobe invented the PDF format does not mean it's the only game in town. Wedged comfortably between free open-source PDF creation apps and the expensive Adobe Acrobat 7 is ScanSoft PDF Converter Professional 3, which combines powerful and useful features with a friendly price.

Converter Pro converts regular files, such as Word, Excel, and Web pages, into PDF files, usually by just printing to the ScanSoft PDF print driver. Unique, though, is its ability to convert PDF files back into Word, Excel, and other files using a built-in OCR engine. In my testing simple documents converted without errors, and even multicolumn documents with tables and inline graphics converted surprisingly well, requiring only minor touch-ups. Converted spreadsheets required a bit more massaging, as formulas, of course, can't be inferred from the OCR-ed digits. Working with the conversion, however, is probably faster than retyping a whole file in most cases.

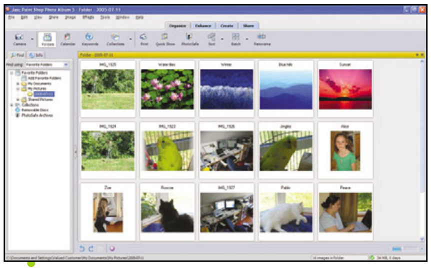
The app includes a multipurpose PDF-reading program that looks and feels like Acrobat. Ironically, though, Converter Pro creates PDFs faster than Acrobat. The reader does take longer to open and redraw PDF files, though, which gets annoying on slower machines. Still, the app is filled with interesting features missing from Acrobat. Form AutoTyper is the best. When you open a PDF file, it appears as if there are blanks to fill in, but click AutoTyper and you can TAB your way through the blanks and start typing. This works even when the PDF's author didn't create a PDF form.

Unlike the free Acrobat Reader, Converter can create PDF forms, set PDF security, and edit PDF file text and graphics. It lacks Acrobat Pro's groupware markup features, though. Thus, it probably isn't appropriate for corporate PDFing environments, but if that isn't what you need, Converter is a worthwhile tool. ▲

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

by Kevin Savetz

Corel Paint Shop Photo Album 5.0



- **Paint Shop Photo Album 5.0**
- $49
- Corel
- www.corel.com

CPU CPU CPU

There's no excuse for your digital photos being an unorganized mess in My Pictures. Many photo organizers can turn that chaos into a tidy garden of digital images. Paint Shop Photo Album 5 is one contender.

After importing photos from your digicam, the app has several options for tweaking them. The tools, however, are primarily aimed at users without much image-editing experience. Quick Fix automatically fine-tunes an image's color and exposure, or you can manually make adjustments with Adjust controls. Other effects include cropping, various tones, adding frames, and the unusual-but-useless Thinify, which shrinks and stretches a photo to make the subject look thinner or wider.

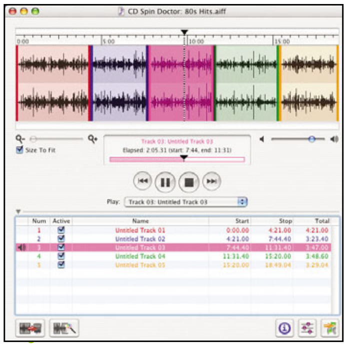
The editing tools are easy to use, but Photo Album has a few problems in this area. I had to manually rotate each vertical image to correct orientation, which became time-consuming. Although my Canon PowerShot S60 encodes orientation data into images, Photo Album apparently ignored this. An Adjust Wizard lets you fine-tune images by choosing between three versions of your image, but the choices appeared so small it was sometimes hard to see the differences.

The app also creates projects, which include templates for greeting cards, scrapbook pages, calendars, CD labels, and more. Projects are pretty simple; just drag your photo into the work area, add text, and choose among several templates for each project. A Share tab lets you email photos, order prints, or burn images to a disc. The slideshow VCD I created worked fine on a Windows PC, but on a living room DVD player, the VCD's on-screen noise made it unwatchable.

Photo Album's biggest liability is the interface, which is sometimes unintuitive. Although the app tries to walk you through the steps in creating a project, you're frequently left wondering what to do next or how to move to the next step.

Photo Album is an adequate photo tool, but other photo-organization programs, including Picasa 2.0, Adobe Photoshop Album 2.0, and iPhoto for Mac OS X, do the job better. ▲

Roxio Boom Box 1.0



CD Spin Doctor: 80s Hits.aiff
0:00
5:00
10:00
15:00
Size To Fit
Track 03: Untitled Track 03
Elapsed: 2:05.31 (start: 7:44, end: 11:31)
Play: Track 03: Untitled Track 03

Num	Active	Name	Start	Stop	Total
1	☑	Untitled Track 01	0:00.00	4:21.00	4:21.00
2	☑	Untitled Track 02	4:21.00	7:44.40	3:23.40
3	☑	Untitled Track 03	7:44.40	11:31.40	3:47.00
4	☑	Untitled Track 04	11:31.40	15:20.00	3:48.60
5	☑	Untitled Track 05	15:20.00	18:49.04	3:29.04

- **Roxio Boom Box 1.0**
- $49
- Roxio
- www.roxio.com

CPU CPU CPU CPU C

Many iPod users consider iTunes the only software they need to make the iPod hum. Boom Box, for Mac OS X 10.3.9 or later, is a set of five tools that makes the iPod and iTunes do more than ever, although the tools may have a familiar ring.

The easy-to-use and quite capable CD Spin Doctor converts analog audio to MP3s. Just connect your turntable, cassette deck, or other audio source to your Mac's audio input, and it digitizes the tunes. Spin Doctor is also included with Roxio's Toast Titanium, so if you have Toast, you have these features.

Audio Hijack is great for creating MP3s from any audio that your Mac plays. For example, you can capture a song from a DVD movie or record a streaming radio station. You can also schedule recordings, such as recording an online radio show daily at 6 p.m. Audio Hijack has been available as shareware for years; you can buy it separately for $16 at rogueamoeba.com.

iPodder X, also shareware ($25; ipodderx.com), is an RSS newsreader and podcasting client. Like iTunes 4.9, iPodder X can download podcasts and video using RSS, but it goes further with BitTorrent support, keyword filtering, and other advanced functions.

MusicMagic Mixer (also sold at music.predixis.com; $30) analyzes the music in your iTunes library and creates playlists with similar "acoustic personalities." It's great for creating playlists of particular moods and is better than the strange juxtapositions a random shuffle can produce.

Finally, iSpeak It converts any document or Web feed into a spoken track using Mac OS' text-to-speech capability. From there you can listen to the file on your iPod. If you can tolerate the computer-generated voice, this is an interesting way to create your own books on tape. Separately, iSpeak It is $15 at www.zapptek.com/ispeak-it.

You could say that as a bundle of old apps, Boom Box doesn't add any value. However, the package combines arguably the best Mac apps for each task into a suite that's considerably less than if purchased separately. The result is a well-conceived five-part harmony of software. ▲

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

USE YOUR BRAIN

left side

Portable Audio for iPods
AC & Battery Powered
XdB™- enhanced Subwoofer
High Efficiency Digital Amplification
Wireless Remote
Built-in iPod® Cradle
Neodymium Drivers
Onboard Digital Signal Processor
S-Video Output
Universal Power Adapter
Auxiliary Input Jack

right side

cool

BOTH SIDES

Introducing the New inMotion iM7. Great Audio, Unplugged Mobility.

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www.alteclansing.com/inmotion

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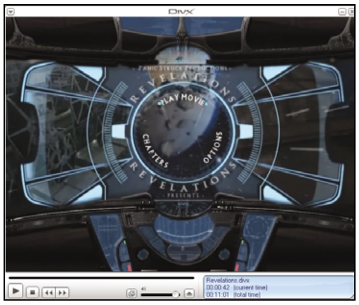
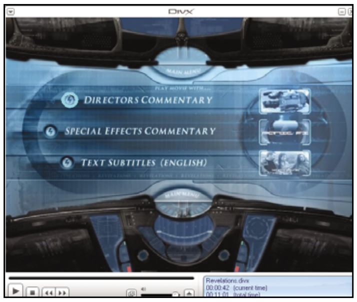
DivX 6 Debuts

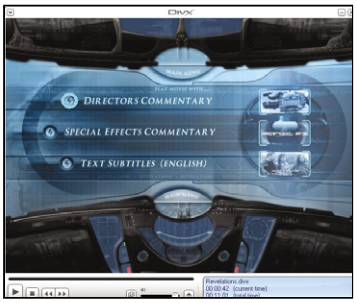
Are The Benefits Worth The Price?

We discovered her contact, a smuggler named Declan.

- **DivX 6**
- DivX Play Bundle, free
- DivX
- www.divx.com







The newly released DivX 6 aims to take a project that might be, oh, 8GB in MPEG-2 and crunch it down into a 2GB DivX 6 file ready to burn to a blank DVD±R disc with little to no perceptible quality loss. (If you have a DivX-compatible DVD player, even better.) In this regard DivX 6 does admirably well because, unlike version 5, the newly implemented DivX Media Format (.DIVX extension) provides for chapter points, subtitles, file metadata, multiple audio tracks (in MP3), and more. Download the "Star Wars Revelations" video from DivX.com and check out the new features in action.

The new DivX Player now supports DivX Media Format features. DivX.com was smart and designed version 6 files to be backward compatible enough to play on devices with version 5 firmware. So your DivX 6 movies will play on existing DivX-enabled DVD players, for example, only without the captions, menus, and other new features. The Player and its DivX Play Bundle are free.

More interesting is the DivX Create Bundle ($19.99; $29.98 with MPEG-2/DVD plug-in), which includes the DivX Player, DivX Pro codec, and DivX Converter application. Coming from the exhaustive and occasionally confusing options in Dr. DivX, version 5's encoder app, Converter is simply a little rounded window into which you drop source files. Pick from four preset encoding profiles—High Def, Home Theater (default), Portable, and Handheld—and press the Convert button. The output file appears in a C:\Program Files\DivX\Movies folder.

DivX.com engineers wanted to make conversion simple, but they realized too late they'd gone too far. You can select which audio and subtitle tracks to include in your output file, and there's an option to combine multiple non-VOB files into one DivX file rather than several, but that's it. There's no resolution selection, bit-rate adjustment—nothing. DivX.com says it's working to remedy this. There are also no tools for creating movie menus, but that will probably come with third-party editor packages.

Using a 90MB source VOB file ("Last Man Standing: The Road to X Games X") DivX.com provided, I converted the file using the Home Theater profile, first in DivX Converter and then in Dr. DivX. Dr. DivX completed a two-pass encoding with all defaults selected in 6:27 (minutes:seconds). DivX Converter did the job in 5:55—a 9% improvement. Less impressive was the fact that while DivX.com promises 20% to 40% smaller file sizes in version 6, the Dr. DivX output was 14,569KB vs. Converter's 14,532KB. My guess is that the differences become greater when dealing with uncompressed source files and/or encoding under other profiles. (The Helium codec is still in beta.)

In looking at bold title text on a background of solid color bands (position 1:34 for those following along at home), both versions were darker than the original VOB image. Both also exhibited a noticeable amount of blocky artifacting around text edges and between color bands. However, all these problems were greater in version 5 than 6. DivX 6 kept colors brighter, edges a bit smoother, and small text clearer due to reduced blockiness.

Later I switched to an action frame with a brightly illuminated biker sailing through the air against a dim stadium ceiling background (position 0:53). The edges of the background girders were usually less jaggy in version 5. Color reproduction was about the same. Where version 6 shined was in its dramatic reduction in blockiness, mosaic artifacts, and tone banding.

Overall, the negative compromises that I observed in DivX 6 files were few and tended to concentrate in shadows where the eye is less likely to focus. That said, it's easy to find differences when comparing paused frames side by side. When playing videos at full speed, DivX 6 comes off a bit brighter and clearer, but this is definitely an incremental evolution. Would I pay the special $9.99 upgrade charge to upgrade from Dr. DivX to the DivX Create Bundle with the MPG/VOB/TS/SVCD plug-in? Sure. Video improvements aside, the faster encode times and new DivX Media Format feature benefits are worth even the $29.98 regular price, and coming support for MP3 Surround will be a great perk. ▲

by William Van Winkle

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Dialogue Box

Codec Roam

by Chris Pirillo

When I think back on all the crap I downloaded in high school, it's a wonder I can think at all. Ah, the Internet is a treasure trove of multimedia goodness. You can download MP3s to your heart's content, and you shouldn't have a problem playing any of 'em on your system. Why? Because MP3 is a ubiquitous format; no one vendor owns and controls it. I'm not talking about the encoding angle, mind you—just the decoding/playback side of things. It has so much proliferation, in fact, that even Sony reversed its decision in the 11th hour and decided to add support for MP3 to its new series of portable digital music players (to accompany its needlessly proprietary ATRAC format).

MP3s aren't the problem—darn near everything else is.

Certainly, Mac OS X fanatics prefer QuickTime audio and video, whereas Windows fanatics typically opt for the Windows Media formats. Oh, and then there is the vastly inferior RealMedia stuff (which, according to enthusiasts, does well with extremely low bit-rate video suitable for 1995's Internet). Bottom line: Joe and Judy Consumer unwillingly allow their systems to host a war every single time they access their favorite media, unaware that one piece of software is competing for their attention over all others. "Would you like to open an endless amount of files in me?" "I'll be your best friend if you let me play back that file." "No, pick me over the others. I'm the only one who supports this format." "I'm Brian, and so is my wife."

Worse yet, it seems software vendors are laboring under the illusion that we want to have every possible ecommerce doodad attached to our default media player. I would not mind having a media manager of sorts, as long as I didn't have to see it every time I opened the player, or if the manager supported all the formats that I have stored on my machine. None of them, and I mean NONE, do the job well. Worse yet, few have mastered the art of skinning. "Oh, wow . . . you're telling me I can download a new, bloated skin that's nothing more than a commercial for the latest Hollywood flop? Cool!" All these players . . . aren't.

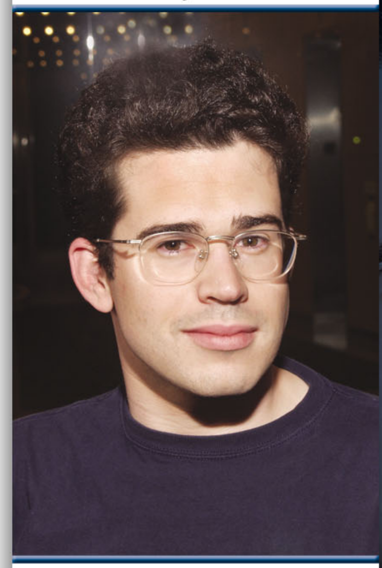
And I'm not just talking about audio, folks.

For the most part, an AVI file plays the same in one player as it does in any other. The only difference may be in the way the software lets you tweak color, hue, saturation, etc. of the video image. The problem might be in the underlying codecs, or lack thereof. If you don't have the right media decoders installed, forget about viewing the video your friend just sent you. Worse yet, if the media player du jour isn't a wise one, it won't tell you what's wrong with the unplayable file(s) or what's missing from the equation.

To the casual surfer, it seems that you'd need three entirely separate media players just to have a single online experience. There's virtually no legal way of working past the insecurities and egos of just about every media codec crafter on the planet (at least, the ones you're likely to run into if you're a media addict or president of your local A/V club). Best package I've found to date is the K-Lite Mega Codec Pack (downloaded from free-codecs.com), which contains just about every possible audio and video encoder/decoder you could possibly need, save all the fringe, semi-obscure formats you're not likely to run into on a consistent basis.

Inside it you'll find the codecs independent from their bundled applications, such as Real, QuickTime, DivX, et al. If nothing else then you'll get a sweet handpicked suite of troubleshooting tools, including SHERLOCK, an informational codec-readout utility, and GSpot, a program to help you figure out what codecs (gspot.headbands.com) that any random AVI might need. The K-Lite Mega Codec Pack isn't without its share of quirks, however. I certainly wouldn't recommend installing everything en masse, just what you know you need. With careless clicking in the install process, you may inadvertently render working applications unstable. Codecs are strange creatures, and I wish none of them existed.

They give us those nice bright colors. They give us the greens of summers. Makes you think all the world's a sunny day, oh yeah. ▲



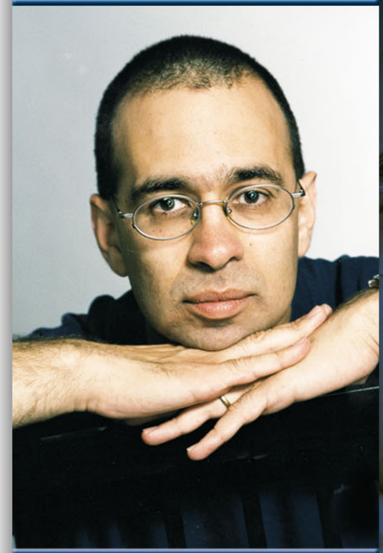
Chris Pirillo was too busy working on Lockergnome.com to write this month's byline, so he asked his fiancée, Ponzi, to fill us in. "The problem is all inside your head," she said. "The answer is easy if you take it logically. I'd like to help you in your struggle to be free." Uh . . . we were just asking about what Chris has been up to, beyond Chris.Pirillo.com and TheChrisPirilloShow.com. She said, "It's really not my habit to intrude. Furthermore, I hope my meaning won't be lost or misconstrued. But I'll repeat myself at the risk of being crude." Oh, jeez. Forgetaboutit. We'll just ask him next month.

To the casual surfer, it seems that you'd need three entirely separate media players . . .

You can dialogue with Chris at chris@cpumag.com.

Free & Open, Part I

by Pete Loshin



Pete Loshin, former technical editor of software reviews for Byte Magazine *(print version), consults and writes about computing and the Internet. He also runs www.linuxcookbook.com. He owns shares of both Microsoft and Red Hat and believes that Windows isn't for everyone, but neither is Linux.*

I really try to stay away from politics, but it's so difficult. The front pages overflow with open-source-related news items, from Supreme Court decisions on copyright enforcement to the loss of millions of financial records. So I'll be writing occasionally about ways open source promotes liberty and freedom.

Consider anonymity. People do bad things when they think no one is looking—write naughty words on the walls, take things that don't belong to them, hurt people who can't defend themselves. So let's do away with anonymity. First, put video cameras everywhere; that'll keep people honest. Other technologies reduce anonymity. Caller ID makes it harder to make anonymous phone calls. EZ Pass devices for paying highway tolls make it harder to drive off the radar. New "smart," wireless IDs can be scanned surreptitiously, and other types of scanners can detect people carrying items they shouldn't be.

The Internet already offers no anonymity. Browser cookies and IP addresses can trace your activities, and ISPs that might shield their subscribers by not cooperating with government demands face the possibility of being closed down or even jailed.

So if you want anonymity, too bad. It's all for the greater good of society anyway. Have you got something to hide? Are you feeling guilty about something? What are you worried about?

What, indeed. Anyone who came of age during the Cold War knows that, unlike in democracies, totalitarian governments strip their citizens of all privacy, using secret police searches, informers, bugs, checkpoints, and demands for "your papers." And despite the undoubtedly many bad things that happen when people can act anonymously, there are important things that can't happen unless people *can* act anonymously.

For example, those working for human rights under repressive governments need to speak freely and anonymously. Closer to home are those who use anonymity to expose corruption and fraud in government and business. Victims of domestic violence need to shield their whereabouts from those who threaten them, as do witnesses testifying against participants in vicious criminal enterprises.

This is all possible by way of introducing Tor (tor.eff.org), an anonymous Internet communication system that implements a network protocol called onion routing. It is, of course, open source. The technology is elegant and fairly simple. You connect with a client by building a virtual circuit across a sequence of routers known only to the clients; individual routers know only their predecessor and successor, but no others. The larger the network of onion routers, the more anonymous the clients can become, as the traffic is mixed and bounced around the network.

But why should we encourage, or even allow, anonymous services such as Tor, which might help criminals? From the Tor FAQ, I quote: "Criminals can already do bad things. Since they are willing to break laws, they already have lots of options available that provide _better_ privacy than Tor provides. They can steal cell phones . . . they can crack into computers in Korea or Brazil and use them to launch abusive activities; they can spread viruses that take control of literally millions of Windows machines around the world."

Eliminating anonymous speech devalues our First Amendment right to free speech. As the Supreme Court ruled in McIntyre v. Ohio Elections Commission (1995), "Protections for anonymous speech are vital to democratic discourse. Allowing dissenters to shield their identities frees them to express critical, minority views." It's no good to have freedom to voice unpopular views when you may be subjected to retaliation by an intolerant society simply for holding those views.

As the Tor FAQ explains, "Tor aims to provide protection for ordinary people who want to follow the law. Only criminals have privacy right now; we need to fix that." When anonymity is outlawed, only outlaws can be anonymous.

Tor is a project of the Electronic Frontier Foundation (www.eff.org), an organization created to "protect our fundamental rights regardless of technology; to educate . . . about civil liberties issues related to technology; and to act as a defender of those liberties." Whether you need to know your rights as an ISP customer or want to know more about the implications for liberty and freedom of the USA PATRIOT Act, the EFF is an excellent place to start. ▲

It's no good to have freedom to voice unpopular views when you may be subjected to retaliation by an intolerant society simply for holding those views.

You can get saucy with Pete at pete@cpumag.com.

The Gentle Art Of Spy Hunting

PUP Patrol Ups Its Game

Be afraid, be very afraid say the counterspies of PC computing. In the past six months, spyware purveyors have ratcheted up their tactics and brought the war for the control of your desktop to a new level. "It's more than doubled across all categories," says David Moll, CEO, Webroot, maker of Spy Sweeper, "and the most malicious forms of spyware have grown the fastest." Profit-driven hackers have learned how to install software on your PC from a Web site without your permission (drive-by installs) and have started distributing backdoors to your system that burrow deeply into the kernel of the Windows OS. Spyware infiltration has gotten so bad so quickly that it's even impressing key malware researchers. "It's accelerated dramatically," says Roger Thompson, director of malicious software research, CA (Computer Associates). "I thought it would take a couple of more years to get to this point, but we're there."

They're Here

"There" is where one-third of system crashes reported to Microsoft are caused by spyware, according to *eWeek*. And the numbers get scarier. In Q1 2005, Webroot's audit of over 1 million PCs found 88% containing some form of PUP (potentially unwanted programs). With definitions and distinctions among the terms spyware and adware always in dispute, the industry has begun to refer to a broad class of background applications as PUPs: keyloggers (which record a user's key strokes), adware (delivering pop-up ads to the desktop), system monitors (recording all PC activities), and Trojans (virus-like infections that can alter and damage system files). While many adware programs do ask for users' permission before installing, others still use deceptive and unclear installation methods to gain access to a system. Webroot found that 64% of PCs have adware on them, with on average seven discrete adware programs on each.

In response, the leading security firms have had to up their game just as quickly and dedicate scores of researchers and artful detection techniques to fight this escalating war on spies.

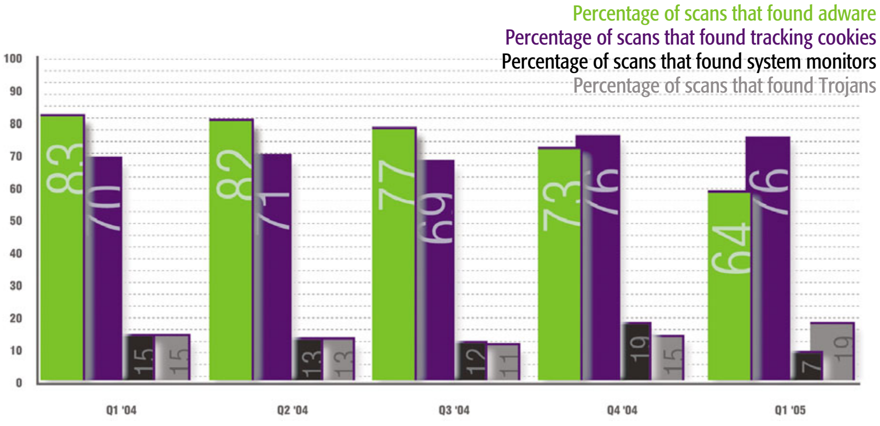
Of Phileas Fogg & Sacrificial Goats

Spy hunting combines low and high tech. Webroot employs 40 full-time researchers, while CA (makers of PestPatrol) has 20, plus the firm's virus-hunting staff. At Lavasoft (Ad-aware) Michael Wood, VP of research, starts with a network of long-standing clients, independent researchers, and persistent internal monitoring of known spyware sources on the Web. Like a worldwide neighborhood watch, the first defense in the war on spies is users themselves who report back to all of these major firms about new infiltrations.

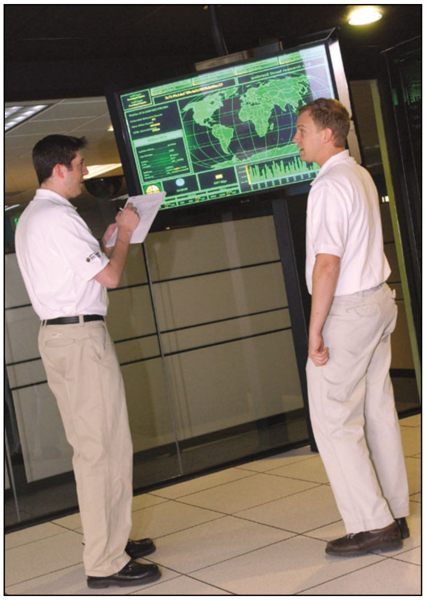
Every spy hunting firm has its own proprietary solution, but Webroot's Phileas Malware Crawler is among the most colorful. Named after the heroic Phileas Fogg of Jules Verne's "Around the World in Eighty Days," it's a server cluster with a network of 100 bots that scour the entire Internet 24/7. Phileas is programmed to peer into the source HTML of sites, regardless of language, and compare any spyware and installers to the current database.

CA also does Web crawling, and when it finds a new suspect, it plants the infection on a computer that Thompson

Consumer SpyAudit Results: All Categories



According to Webroot's SpyAudit Report, the number of PCs infected with some spies has actually declined as consumers and corporations adopt antispy software. But the most destructive spyware, Trojans, is on the rise.



Webroot's spyware researchers operate Phileas, a Web crawler designed to sniff out Web-based spy installers regardless of language or national origin.

and the lab staff call "a sacrificial goat." After taking a ghost image of the PC's hard drive, researchers load the spy, monitor all of the system changes on a clean OS install, and ultimately compare the result to the original ghost image.

Follow The Money

Unlike virus writers, who often work alone and only work to satisfy their egos, spyware writers work for profit. They can make money from identity theft or commissions from legitimate ad networks that pay these "affiliates" every time they install adware, even surreptitiously.

Today the cutting edge is detective work: advanced research into spyware "gangs" similar to what Thompson does at CA. He discovered a dozen Eastern European groups who use drive-by installation techniques to get adware commissions. These Web gangs also install keyloggers and backdoors that communicate personal information back to a gang's host or pull down even more adware to a machine. Another subset, the botnet gangs, actually scan for open ports of PCs connected to the Internet and install spies that convert PCs into soldiers of a zombie army that can distribute malware elsewhere.

Of course marketing companies such as Claria, 180Solutions, and WhenU argue that, unlike spyware such as keyloggers, their permission-based adware installations are legitimate ad services that help underwrite free software. Adware bundled with programs such as Kazaa is the price of freeware, says Executive VP Alan Morris, Sharman Networks, which makes the P2P client. The free version of his program not only bundles seven add-ons but disables Kazaa if users remove the adware.

Spy hunters say they have discovered that the relationship between spyware and adware is actually more subtle and entwined than that. "To us the distinction is semantic at this point," says Moll. In fact, an ecosystem has evolved where adware actually supports the spyware industry and vice versa. As Ari Schwartz, associate director, Center for Democracy and Technology, outlined to a U.S. Senate Committee on Commerce, Science, and Transportation in May of this year, adware firms rely on affiliate marketing; they pay partners such as Kazaa and independent installers for every instance their adware is installed on consumer PCs. But hackers or rogue affiliates also exploit these plans and get paid by many adware companies even when the installations are surreptitious via a drive-by or backdoor spyware trick.

Webroot estimates that $2 billion of annual online ad spending goes toward adware-initiated pop-ups, home page hijacking, and search redirections. "As long as they do affiliate marketing, the affiliates can do whatever they like, and the adware companies just blame the affiliates," says Thompson.

And oddly enough, some of America's leading consumer brands are at the top of this spyware/adware value chain. J.C. Penny, Orbitz, and Sprint, among many others, have used pop-ups via adware. Elements inside and outside of the PC industry are no longer buying the line that adware is straightforward and innocuous.

To be sure, the most visible adware companies are making genuine efforts now to clean up affiliate networks as legislation and prosecutions loom. Nevertheless, as Schwartz illustrated for the Senate, there are many lesser-known adware purveyors who are happy to work under the radar and feed a spyware industry with payouts for any installation they can manage. And there are still the identity thieves, who use keyloggers and backdoors to harvest financial information to sell in underground markets worldwide.

The Coming Storm

The U.S. House of Representatives Judiciary Committee approved an I-Spy Act in May that punishes the most pernicious forms of spyware, but it awaits House and Senate ratification while multiple state laws make their way through local legislatures. Pubic awareness is up, and in fact, Webroot detected a slight decline in spyware penetration among PCs it polled in early 2005. Spyware scanning software has become de rigueur. Some argue that the coming Longhorn version of Windows and Internet Explorer 7 will

DANGER:
Live Viruses
Items are not to be removed from this room.

In the pest farm: A Computer Associate's researcher catalogues over 250 virus, Trojan, worm, and spyware samples the company harvests every week.

be hardened specifically to resist spyware. Nevertheless, the number of PUPs active on infected systems is rising. Spyware purveyors have become dangerously adroit at bolting themselves onto systems so that PCs actively pull multiple spies and adware programs until they finally grind to a halt under scores of conflicting programs.

And 2005 has become the year of the smart spy. Wood is seeing intelligent infiltrations that actively thwart removal by hyper-updating their identity daily and running multiple processes. Eliminating one operation leaves another one running to reinstall the spy. These programs often use what hunters call a trickler, which reaches out to the spyware's home server to pull down a new version of itself on a regular schedule. And, some experts expect to see drive-by installations slipping into RSS feeds soon.

If spy hunters sound a bit alarmist, it's because they see the game raised every week. Some spyware now changes security settings on a PC and masquerades as valid software, even pretending to be antispy scanners. The most troubling development is the emergence of root kits. These tool sets drill spyware into the kernel of the OS, actually hiding parts of the system Registry and making its own files invisible to detection and removal programs. These infections are becoming so elusive and destructive that scanning a PC for spies will be too little too late because once the pest is present, it will be impossible even for the spy hunters to remove. The next wave of antispy techniques will rely even more heavily on preventative measures, better security settings, and active monitoring of communications between a PC and the outside world.

Much like sci-fi scientists warning of a freak apocalyptic epidemic, the spy hunters say that the well-funded enemy has genetically altered itself to mimic the secretiveness of the Trojan, the distribution mechanisms of the worm, and the destructiveness of a virus. "Spyware has the worst elements of all the security threats we have seen in the past," says Moll. "This is a perfect storm, a genetically modified organism."

by Steve Smith

Q&A David Moll: A Reformat In Your Future

As spyware becomes more virus-like and destructive, detection software may be too little, too late, says David Moll, CEO of Webroot. Prevention, legislation, and vigilant technology will be necessary to fight the war on spies.

CPU: What are some of the trends in spyware?

Moll: In infiltration spyware writers can get in nonexecutable files like music or pictures. We saw a keylogger with an SMTP client, essentially its own version of Outlook Express to avoid messaging security. Trojans actually do port scanning to find a way to call home. We see spyware with its own drivers, written at real low levels. The day may be out there that if a spy gets on your machine, you simply need to reformat.

CPU: Will security improvements in Internet Explorer 7 and Longhorn provide solutions?

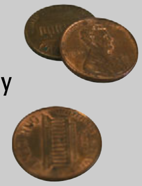
Moll: I don't think so. I predict that within a week of the launch of IE 7 there'll be new exploits uncovered. Within a day of Longhorn you'll see exploits. They're good and important levels of defense, but you've got the motivation of people who are making money on the other side. [Microsoft] is too big a target and too many people are motivated and taking shots at it. I fully believe the software that will get on is going to be spyware. It doesn't make sense to write a virus [anymore] because it doesn't pay. If you're going to use those skills, people will write spyware.

CPU: Is this a winnable war?

Moll: It is winnable, but it takes four elements working in cooperation. There needs to be a law that offers a heavy set of penalties and a clear set of guidelines of what is and what isn't [spyware] at the federal level and with international cooperation. It's got to be enforced. Until we see some folks led away in handcuffs, visible repercussions to these federal laws, I think it's all going to be theory. There needs to be public awareness. Your readers are probably the neighborhood administrators. They are going to talk to their family and neighbors about what they should do on their PCs. All of those things are important, but it still takes technology to fight technology. Laws no matter how well enforced and public awareness no matter how high, unto themselves don't solve the problem. You have to have good technology, but technology isn't workable unless you have the rest of it. I think of this as a partnership. ▲

Infinite Loop

"A Penny Saved . . ."



Alabama resident Edmond Knowles really put meaning to the old phrase when he cashed in his pennies in return for $13,804. Cha-Ching! According to the Associated Press, Knowles had been saving pennies for 38 years. The AP reported that Knowles' 1,380,459 penny cash-in broke the previous record of 1,048,013. Maybe the phrase should be changed to "A penny saved is . . . a whole lot of cash!" ▲

Source: www.azcentral.com

The Department Of Stuff

by Rob “CmdrTaco” Malda

tor.txt

In the early days of the Internet it was so very easy. To determine the unique identity of your user, you simply looked at the IP that they used. Same IP, same user. Repeat.

Obviously this was a terrible idea, and soon after came along cookies. Of course at the time they were tremendously controversial, but at long last Web designers could uniquely identify their users without passing a session key along in every URL string.

Things continue to get more complicated. The ever looming fear that the ’Net will ultimately run out of IP address space has combined with improved security innovations such as firewalls and caching proxy servers to further complicate matters. Today you can’t even rely upon a user loading two consecutive pages from the same IP.

This leads me to this month’s topic: anonymity online. Historically there have been a handful of public proxy servers such as www.anonymizer.com that are simple relay servers. You connect to them, they connect to the site you want to anonymously read. And now your IP is never shown to the server because their logs contain only the proxy that routes your packets. This creates a single point of failure. As a Webmaster it becomes fairly easy to find and tag these hosts and employ whatever security measures are appropriate. And for law enforcement officials, point A to B through X is a relatively simple thing to track down.

But those were the easy days. Now we’re seeing the next level of IP abstraction, further distancing users from their IP address and increasingly obfuscating their identity. New services such as Tor (tor.eff.org) and I2P (www.i2p.net) aim to provide users with a secure Internet tunnel that they can use for a variety of legitimate and nefarious purposes; and anyone coding a Web page needs to be aware of the repercussions.

How these services work is ultimately fairly simple: The service consists of a network or cloud of machines. When a user joins the network, he uses the cloud as his proxy server. Instead of the client talking directly to the server, the client talks to the anonymizing network which creates a circuit or pathway through the cloud, ultimately popping out of an exit node and loading the Web page you want. So now client A reading server B through one of these networks could have dozens of IPs in between A and B.

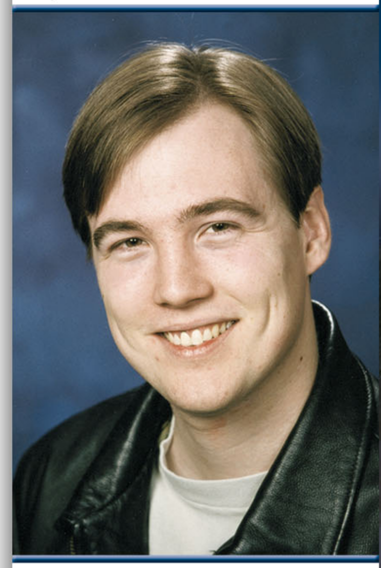
As a Webmaster, this can be a truly frightening experience. At my day job, these anonymizing networks were used to launch denial of service attacks within days of their launch. It took us some time to work around these new problems. If you are a Webmaster, you need to treat anonymizing networks similarly to how you would any cloud of proxy servers. However, since they don’t typically identify themselves, and they don’t generally come from the same class C of IPs, it’s much trickier to identify.

These new networks are going to be an increasing issue for anyone who tries to serve content online. Already the popular Azureus BitTorrent client has incorporated Tor support. So software pirates can now obscure their IP through the network of anonymous, random IPs scattered around the globe. For copyright holders the issue is right where it has always been, creating good technical protection for their work. Real encryption. Then the consumers can decide to purchase copy-protected work or not.

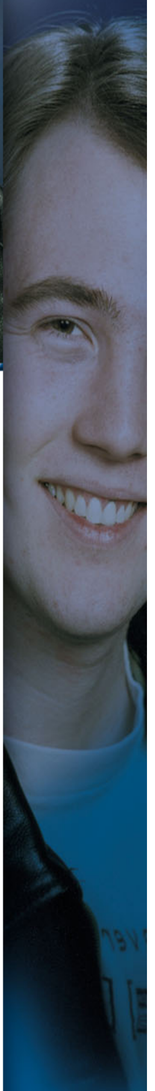
For Webmasters it is much harder. Do you let users log in from these anonymous networks? Do you let them post and use your services? No doubt that depends substantially on your content. For Slashdot we really want to let anyone read the site, but for comment posting we have to be increasingly more careful in order to prevent denial of service attacks. Since none of the anonymizing networks today clearly identify themselves, you’ll have to be very careful.

The issues we are facing today with anonymizing networks are philosophically similar to the ones the Internet dealt with a decade ago when proxy servers and cookies changed the landscape of the Internet. It’s up to the content providers to decide what is best for their own content because these networks are only going to grow. ▲

Email me at malda@cpumag.com, but sign your name please!



Rob "CmdrTaco" Malda is the creator and director of the popular News for Nerds Web site Slashdot.org. He spends his time fiddling with electronic gizmos, wandering the ’Net, watching anime, and trying to think of clever lies to put in his bio so that he seems cooler than he actually is.



As a Webmaster, anonymizing networks can be a truly frightening experience.

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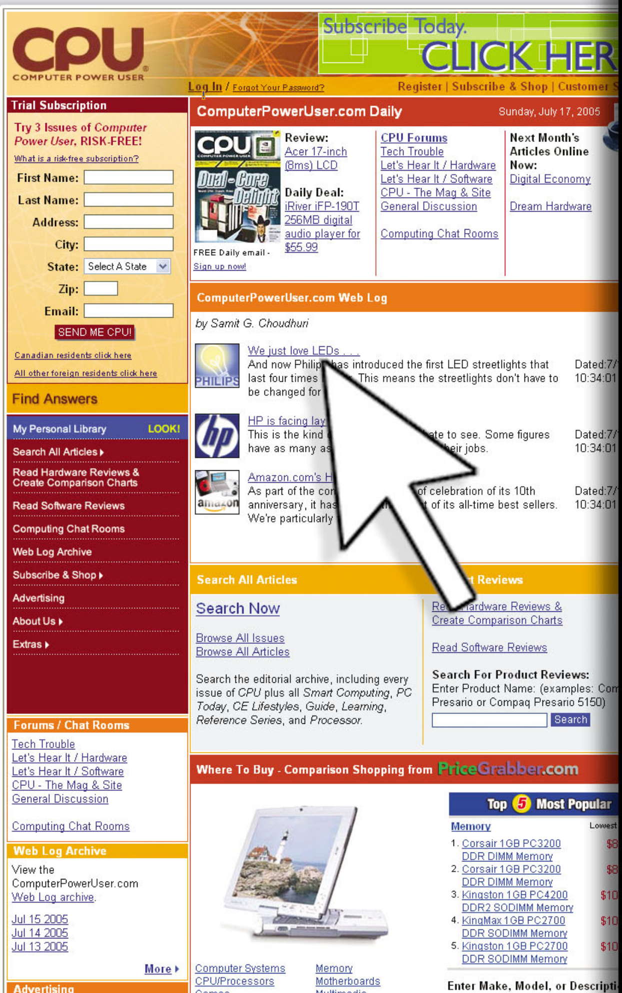

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ComputerPowerUser.com Web Log

by Samit G. Choudhuri

We just love LEDs . . .
And now Philip has introduced the first LED streetlights that last four times … This means the streetlights don't have to be changed for … Dated:7/ 10:34:01

HP is facing lay…
This is the kind … ate to see. Some figures have as many as … eir jobs. Dated:7/ 10:34:01

Amazon.com's H…
As part of the co… of celebration of its 10th anniversary, it has … t of its all-time best sellers. We're particularly … Dated:7/ 10:34:01

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2. Corsair 1GB PC3200 DDR DIMM Memory	$8
3. Kingston 1GB PC4200 DDR2 SODIMM Memory	$10
4. KingMax 1GB PC2700 DDR SODIMM Memory	$10
5. Kingston 1GB PC2700 DDR SODIMM Memory	$10

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ROAD Warrior

by Jen Edwards

Speck Products Spruces Up The iPod

Thanks to some innovative new case designs from Speck Products, you can get even chummier with your iPod than you probably already were. Speck's iGuy ($34.95) is a combination protective case and toy-like desktop companion for the iPod. The iGuy not only has posable elastic arms, it also uniquely sits in the iPod Dock, making it one of the few dockable cases available. In addition to adding some personality to the music player, the iGuy offers many standard features users expect, such as a removable screen protector. Two different versions of the iGuy work with fourth-generation and iPod photos or the iPod mini.

Another option from Speck Products is the HandSkin for iPod, which is a case designed for those with more active lifestyles. Instead of a belt clip or arm strap attachment, this case features an adjustable, removable strap that is molded to fit the hand. The strap can make it more comfortable to hold an iPod while exercising instead of having it bumping around on your belt. The HandSkin also includes a ruggedized cover to protect against accidental drops and bounces. It's compatible with fourth-generation and iPod photos only.

Finally, if you're looking for an even more stylish iPod accessory, it is hard to go wrong with the Portfolio Case. Available in pink or frosted white, each Portfolio comes with four color-coordinated straps that hold the case closed while the iPod is in transit. The pink case comes with black, white, lime green, and pink straps, while the white case includes black, blue, orange, and lime green straps. Designed for 4G iPods, the slip-on case is also big enough to stash away an ID and some cash in, allowing it to function separately as an ultra-trendy mobile accessory.

Each case is $34.95 and available directly from Speck Products or from major national retailers. ▲

PocketMirror Pro & BitTorrent For Windows Mobile Devices

Chapura has introduced a new version of PocketMirror Professional for Windows Mobile devices. The app is designed to overcome some of the limitations of Microsoft ActiveSync, which only allows for synchronization of personal data from the default personal folder in Outlook to a handheld device. With PocketMirror Pro you can synchronize multiple Outlook folders, including Exchange public folders, with the handheld. Support for the Business Contacts folder is also included with the Business Contact Manager, and you can create pseudo-folders in Outlook by synching categories in Pocket Outlook.

The app should be especially helpful for mobile professionals who need to access company directories and other data typically stored in public folders on a corporate Exchange server. Instead of being limited to Calendar, Contacts, Tasks, and Notes details stored in personal folders, the software will give Windows Mobile handhelds and smartphones more powerful and flexible sync options than what Microsoft ActiveSync normally supports. The app ($49.95) is available from Chapura and resellers.

Also now available is WinMobile Torrent ($20), the first BitTorrent client for Windows Mobile devices. The app from Adisasta lets you "leech and/or seed multiple torrent files." ▲

Wireless: Not Just For Networking Anymore

As wireless technology becomes more integrated into our daily lives, developers and manufacturers are coming up with creative and innovative ideas to make life easier and better at the same time. For example, a Japanese apartment developer is reportedly installing new keyless locks. The locks aren't based on RFID but instead use a special code that users enter on a mobile phone to unlock the door. Hotels have long used magnetic key cards instead of keys, but this is believed to be the first example of a mobile phone serving as a key in addition to a communication device.

RFID has entered the home-security arena with the Gateman door locking system. Each lock comes with eight RFID keys that will unlock the door. A backup system ensures that the door will stay locked if the power goes out, and the system also features heat sensors designed to protect against the lock being foiled by mechanical means. More information is available at The Gadget Home Web site.

Finally, Italian printer Modulgraf has designed a talking wine label that's based on RFID technology. A chip implanted in the label can be programmed with information, such as taste characteristics, where the wine came from, the vintage, and suggested food pairings. In addition, counterfeiting would become more difficult with the label, helping to ensure that consumers are actually getting the genuine product. The technology is to be unveiled at a wine fair in Milan this November. ▲

Motion Computing Debuts 8.4-Inch Tablet PC

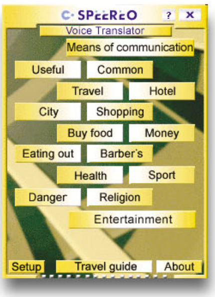
Motion Computing's new LS800 is only about nine inches long and one inch thick and weighs only 2.2 pounds, but it offers an impressive set of features. Based on a 1.2GHz Intel Pentium M processor, the system comes with 256MB of RAM (upgradeable to 512MB), a 20GB hard drive (also upgradeable), and an 8.4-inch SVGA display. The LS800 also supports 802.11a/b/g wireless networking and has integrated Bluetooth. A fingerprint reader for biometric security is standard, as is an SD card slot.

The unit's suggested retail price with Windows XP Tablet PC Edition 2005 is $1,899. Motion Computing offers a variety of accessories and upgrades, however, including a Motion Medical Pack with software designed to make the LS800 an invaluable tool in clinical practice. A docking station with several additional ports and a stand that orients the computer vertically or horizontally will be available in mid-August for $179 or as a bundle with an additional AC adapter for $199.99. Carrying cases, keyboards, additional stylus pens, and CD-RW/DVD drives have also been announced. ▲

Mobile & Multilingual

Two recent software announcements aim to make Windows Mobile handhelds more valuable as language tools. Paragon Software has released a new version of its Pen Reader handwriting-recognition application ($29.95), which includes improved support for German, Russian, Czech, Belarusian, and Ukrainian text entry. Users can switch between languages on the fly, and the software uses both graphical and orthographical analysis to improve the quality of handwriting recognition. Training isn't required to use the Pen Reader, as the software can learn characteristics of your handwriting to achieve better recognition results. Optional language support software from Paragon will also enable a Windows Mobile handheld to support a variety of additional languages.

Speereo Software has updated its Speereo Voice Translator ($40) to version 2.1. The unique feature of the software is that it can recognize spoken words, making it an ideal companion for international travelers. You just speak a word or phrase, and the software installed on a Windows Mobile handheld or smartphone immediately reads back a translation in Spanish, German, French, Italian, Russian, Chinese, or Japanese. The database includes about 4,000 terms in 16 categories and 87 subcategories, such as travel, city, food, shopping, health, sports, and entertainment. Business, medical, technical, and legal terms are also included.



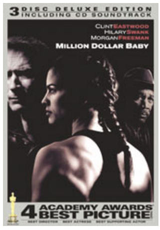
The Speereo Voice Translator is also integrated with the Columbus Travel Guide series, which covers every country and major world cities, letting you find information on hotels, restaurants, and sightseeing. The program runs on Windows Mobile 2003 Second Edition and is available for $19.95 for English, plus one language of your choice, or $40 for a bundle that includes all supported languages and three free Columbus Travel Guides. You can buy additional travel guides on an individual or regional bundle basis at the Speereo Web site. ▲

At Your Leisure

The entertainment world, at least where it pertains to technology, morphs, twists, turns, and fires so fast it's hard to keep up. But that's exactly why we love it. For the lowdown on the latest and most interesting releases in PC entertainment, consoles, DVDs, CDs, and just leisure and lifestyle stuff we (for most part) love and recommend, read on.

Audio Video Corner

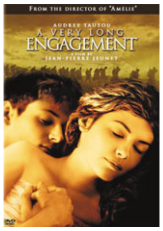
DVDs by Samit G. Choudhuri,
CDs by Blaine A. Flamig


3 DISC DELUXE EDITION INCLUDING CD SOUNDTRACK
Clint Eastwood
Hilary Swank
Morgan Freeman
Million Dollar Baby
4 Academy Awards Best Picture

Million Dollar Baby (3-Disc Deluxe Edition)

Maggie Fitzgerald (Hillary Swank) has led a life that's gone nowhere fast. She wants to make a mark for herself and ends up in a boxing gym owned and run by Frankie Dunn (Clint Eastwood, who also directed/produced the film and composed the soundtrack) and Scraps (Morgan Freeman). Her nonstop efforts impress Scraps, who ultimately persuades Frankie to coach her. What follows is what you'd expect if you've already seen the first "Rocky" film, but the final third of the movie takes a twist that you never see coming. "MDB" was nominated for seven Academy Awards (and walked away with four) this year—highly recommended.

$39.95
Warner Brothers
milliondollarbabymovie.warnerbros.com



A Very Long Engagement

From director Jean-Pierre Jeunet ("Amélie," "Alien: Resurrection") comes a World War I film with the surreal flair for which he's so well known. Mathilde (Audrey Tautou) headlines as the woman whose lifelong childhood love and fiancée (Manech, played by Gaspard Ulliel) goes off to war. When news comes of his passing, she does not believe it and thus begins her journey to find him. The stunning cinematography, unique visual effects, and (sorry) engaging storyline keep things interesting. This is a French language film with English subtitles; definitely a good one for date night because it appeals to both sexes.

$29.95
Warner Brothers
wip.warnerbros.com/avle

Willie Nelson —"Countryman"

Has Willie Nelson really gone reggae? If you know anything at all about Willie, the idea of it really isn't that absurd. Ten years after originally discussing the possibility with then Island Records president Chris Blackwell (who gave Bob Marley a musical home), "Countryman" is finally seeing the light of day, just on a different label. The 12 tracks are hit and miss, but a duet with the great Toots Hibbert on the Johnny Cash-penned "I'm A Worried Man" and a cover of Jimmy Cliff's "The Harder They Come" are reason enough for Nelson addicts to indulge.

$14
Lost Highway
www.willienelson.com

Frank Black—"Honeycomb"

Just days before Frank Black reunited with the Pixies last year to rock the damn country (the best show we saw in 2004), he ventured to Nashville to record "Honeycomb," a collection of melodically splendid, yet subdued, songs recorded with the likes of the legendary Steve Cropper (Booker T. & The MGs), Spooner Oldham (Neil Young), and the great Buddy Miller (Emmylou Harris, Steve Earle). "Honeycomb's" countryish, soul-flavored tracks are Black's most personal works to date and a welcome departure.

$14
Back Porch
www.backporchrecords.com

See the full reviews from A/V Corner at www.cpumag.com/cpusep05/AYL

DVD Byte

Aug. 2, 2005

Alexander (Theatrical/Director's Cut)

Downfall

Guess Who

Aug. 9

The Muppet Show: Season One

Kung Fu Hustle

Aug. 16

Sin City

My Left Foot (Collector's Series)

The Simpsons: Complete Sixth Season

Aug. 23

Six Feet Under: The Complete Fourth Season

L4yer Cake

Gladiator (Extended Edition)

Witness (Special Collector's Edition)

Aug. 30

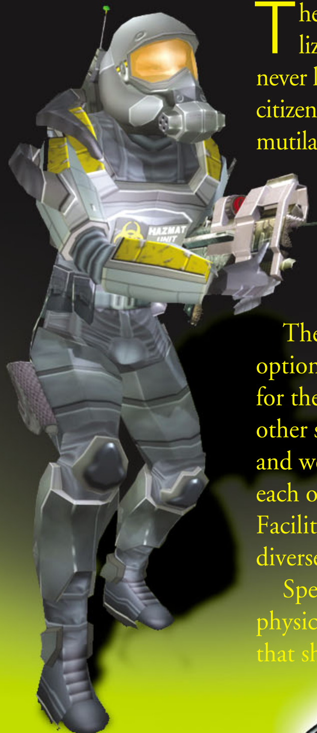
The Blues Brothers (20th Anniversary Edition)

Curb Your Enthusiasm: Complete Fourth Season

Sahara

AREA-51

The Truth Is Out There



The Illuminati have been secretly controlling modern civilization for centuries. The United States of America never landed on the moon. The U.S. government lies to its citizens and practices the art of misdirection. Cows have been mutilated. Aliens are amongst us. Area-51 offers concrete proof to us of all this in the form of an FPS. The game follows a familiar theme: Secret government scientific research has created a virus/monster/weapon that has slipped from its control. As a member of a Special Ops Team, your job is to kill it.

The game's design is open-ended enough to give you the option of either fighting all the bad guys or making a run for the door with the hope that there's a med kit on the other side of that door. The game levels are highly detailed and well thought out. Level design was consistent with each of the various themes (HQ building, Underground Facility, Grey's Lair, etc.); they're also diverse enough to keep you interested.

Special detail was also given to the physics of the game: Firing weapons that should have strong recoil will shake your screen and require you to reacquire your target after firing a few rounds—just like in real life. Grenades bounce and correctly respond to gravity. One of the alien weapons lets you bounce projectiles off walls and around corners. The only problem is that the bad guys can also frag you with a similarly placed bank shot. And later in the game, if run out of ammo, you can transform yourself and become a long distance and short range bio-weapon that feeds off of rotting corpses.

With the abundance of mediocre to terrible games out there, it is refreshing to come across a game like Area 51, which is priced affordably (on the PC) and brings a lot of entertainment value to the table. Oh yes, the voice acting, which comes courtesy of Marilyn Manson, David Duchovny, and Powers Booth, is mostly forgettable. (Take that back—Booth does a good job.) ▲

$29.99 (PC), $49.99 (Xbox, PS2)
ESRB: (M)ature
Midway Home Entertainment
www.area51-game.com

Game Reviews by Samit G. Choudhuri & Chris Trumble

BATTLEFIELD 2

Mayhem At Its Best

We knew Digital Illusions was onto something when we sat down with them behind closed doors at E3 last year. Even then, the game showed promise. Unlike the previous games in the series (Battlefield 1942 and Vietnam), Battlefield 2 brings us to the present day with accuracy aplenty. Battlefield 2 is fun to play for novices and veterans alike, unlike some titles that get overly involved in reality at the expense of playability.

There's a single game mode: Conquest. Having a single gaming mode is in no way limiting; your team focuses on securing the control/spawn points on a map while taking down the enemy team. Conceptually it's not tough to understand, so novice Battlefielders will have no problems jumping into the fray. All manner of modern in-game electronic conveniences keep you connected with your teammates and show you your objectives. To top that off, each game supports VOIP, so you can attach a headset and stay in voice contact with your squad.

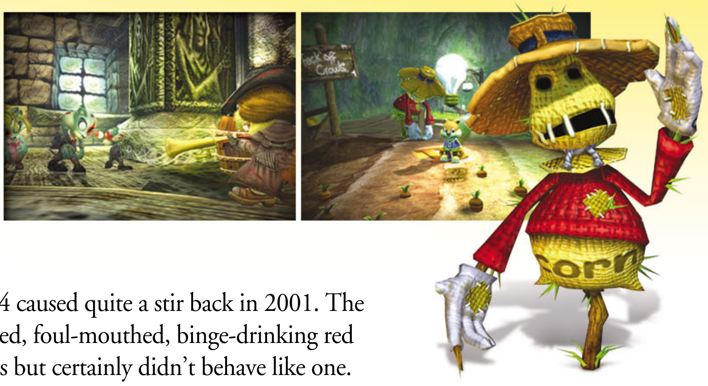
You don't just score based on kills; you can pick character types, such as medics or engineers, to heal comrades or fix vehicles, respectively. Why do you care? Because as your score goes up over the weeks and month of gameplay, so does your ranking. You won't be a Private forever. Battlefield 2 is the game that has pulled us away from our World Of Warcraft addiction. We haven't even touched upon the attractive new graphics engine and the solid physics feel of weapons and vehicles.

Look no further if you want to have a great time with a solid, squad-based action shooter. Word to the wise: The game will be more satisfying if you can get some of your pals to go online as part of your squad. Your game and friendships will only benefit from the experience. ▲

$49.95 (PC-DVD/CD)
ESRB: (T)een
Electronic Arts
battlefield2.ea.com

Conker™ Live & Reloaded

$49.99 (Xbox)
ESRB: (M)ature
Microsoft Game Studios
www.conker.com



Crude But Effective

Conker's Bad Fur Day for the N64 caused quite a stir back in 2001. The game's protagonist, a self-absorbed, foul-mouthed, binge-drinking red squirrel, looked like a character for kids but certainly didn't behave like one.

Conker: Live & Reloaded combines an update of Bad Fur Day with a new multiplayer game with Xbox Live support. The new BFD includes some in-jokes for fans of the original and graphics as good as anything else on Xbox. The controls aren't as precise as they should be for a platformer where a misstep means death, but BFD's crude but clever wit and numerous pop culture references make the effort worthwhile for the 10 to 15 hours it will likely take you to finish it.

The multiplayer game is a blast; you can play as one of several character types (sniper, heavy weapons expert, rifle-toting grunt, etc.) and must work with your team to accomplish common multiplayer goals. The action is fast and furious, and you'll probably find as we did that hours pass in the blink of an eye. ▲

Shin Megami Tensei Digital Devil Saga

$49.99 (PS2)
ESRB: (M)ature
Atlus
www.atlus.com/dds

Good Karma

Shin Megami Tensei: Digital Devil Saga is a fresh, interesting console RPG that leans on its share of RPG conventions (turn-based, menu-driven combat and random monster encounters, for instance) but has lots of fairly novel stuff going on, as well.

DDS' world is more like an artificial construct than a natural world at first glance. Called the Junkyard, it consists of several distinct zones set in a circle around a huge tower called the Karma Temple. The zones are controlled by warring tribes that vie for access to the Temple, which is supposedly the key to ascending to Nirvana. One day during a battle between neighboring tribes, a mysterious artifact erupts in a shower of light, that changes all the people living in the Junkyard, giving them the ability to transform into otherworldly creatures craving bloodshed and violence. Nobody knows how or why, but the powers that be goad the tribes into all-out war and a quest to ascend the temple.

DDS looks and sounds great, has deep combat and character advancement systems, and a story that is instantly and consistently intriguing. A sequel is coming this fall, so don't expect a tidy resolution of all the game's events, but DDS is a must-have for console RPG fans. ▲

HALO 2 MULTIPLAYER MAP PACK

Get Your Fix

So you need more Halo and you need it now? Bungie has heard your plaintive cries, and although work on Halo 3 is in full swing—it'd better be, anyway—some of the guys took some time out to hook you up.

The Halo 2 Multiplayer Map Pack lets you quickly and easily install nine new multiplayer maps to your hard drive instead of downloading them in three bunches over Xbox Live. The disc also includes designer commentary, some classic trailers, and a short animated film about a squad of ODSTs in Old Mombosa.

After extensive play-testing, we have three words for you: Get it now. ▲

$19.99 (Xbox)
ESRB: (M)ature
Microsoft Game Studios
www.xbox.com

ADVENT RISING

A Swing & A Miss

We were initially bullish on Advent Rising's interesting visuals and epic story, but in the end, the game couldn't live up to the hype. For one thing, AR is incredibly buggy; it crashed and froze our Xbox in the first hour of play, and numerous graphical and gameplay glitches left us wondering how complete it really was at release. Its controls and story (at least in presentation, especially where pacing is concerned) are mediocre at best.

Unless you're really hard up for a sci-fi action game, we recommend renting this one, if not skipping it altogether. A PC version will be available when you read this. ▲

$49.99 (Xbox; $29.99 PC)
ESRB: (T)een
Majesco Entertainment
www.adventtrilogy.com

Arcade Racing For Automotive Purists

In January of this year, we watched a beta of Forza Motorsports blue screeen during Bill Gates' CES keynote speech. Ouch. Times have changed. The game has come full circle and now *it* is the master.

This is the first Xbox racing game to give Sony's Gran Turismo series a run for the money. Nearly every aspect of the game is an improvement on GT4's features. Forza's vehicles model damage (not just cosmetically, but in the way the cars handle after taking damage), which is a huge change from GT4. The added bonus of online play (with a Career option) on Xbox Live and superb graphics make this a very competitive racer.

A racing game is nothing without accurate controls, and Forza does not disappoint. A few practice laps in the car of your choice demonstrates that easily. Xbox car enthusiasts finally have a game that meets the challenge thrown down by GT. We're looking forward to the championship when next-gen versions of these titles are released on Xbox 360 and PS3. ▲

$49.99 (Xbox)
ESRB: (E)veryone
Microsoft
forzamotorsport.xbox.com

Harmony 880

Advanced Universal Remote

It's All About Simple, Easy Control

Logitech purchased Intrigue Technologies (makers of the Harmony Remote controls) last summer. The Harmony 880 is the first remote that's received the design scrutiny of Logitech's engineers and is the curent flagship in the lineup.

The infrared 880 looks similar to Harmony's previous remotes, but this one's got a lot more going for it. Upon opening the box, you will first need to charge the included lithium batteries in the remote's included docking station and install the software. After a few hours, you'll be ready to plug the remote into your PC's USB port. Log into Logitech's Harmony Remote site to set up a user/remote profile. Setup for four components and their key functions took us 10 minutes (wow!). Then it's time to transfer the settings to your 880 and you're good to go.

The full-colour LCD screen makes it easy to read the user-friendly prompts and functions. Each icon defines an activity and pushing a button corresponding to the screen sends signals to all related devices. It's a highly advanced remote with an excellent balance between usability and complexity in the upper spectrum of mid-priced remotes. - *Samit G. C.*

$249.99
Logitech
www.logitech.com/harmony

adidas_1

Processors In The Soles Of Your Shoes

Do these shoes behave as advertised? Yes, they do. And remarkably well to boot. Every step you take, every move you make, every breath you take, these shoes will be monitoring you. Each shoe takes about 1,000 readings per second and sends this data to the built-in 20MHz processor (capable of 5 million calculations per second) in the arch. The processor then adjusts the cushioning by activating a tiny motor which adjusts a cable that stiffens and softens the shoe to better adept to the terrain. Each and every foot strike is sampled and adjustments are made before said foot hits the ground again.

The replaceable batteries are located in the soles of the shoes and accessed by lifting out the insole. Foot fatigue while pounding out the miles noticeably improved, but the $250 price tag is rather overwhelming and keeps us from recommending it wholeheartedly. If you must have the ultimate electronic shoe, this is it. It works. What we find most exciting, however, are the various applications that may potentially be added to future shoes by way of similar design. Adidas has shown some real innovation here. And cool tech shoes are a good excuse for some of us house trolls to get out and exercise. Visit the Web site for a good visual on how the shoes achieve what they do. - *Samit G. C.*

$249.99
Adidas
www.adidas.com/campaigns/adidas_1/content

FrozenCPU.com
128 TURK HILL OFFICE PARK . FAIRPORT . NY 14450
www.frozencpu.com 1.877.243.8266 M-F 10-6 . SAT 11-4

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9.4 ✓ RESELLER RATINGS

Software Tips & Projects

Advanced Spy Killing, Part I: Make A Spy Hunting Kit

How many times in the past year have you been called in to cure a friend or family member's PC because spy/adware has ground things to a halt? We're here to help. In this first part of a short series on spyware defense, we pack a traveling CD of diagnostics and clean-up tools and walk you through the necessary first steps.

Make A Killer CD

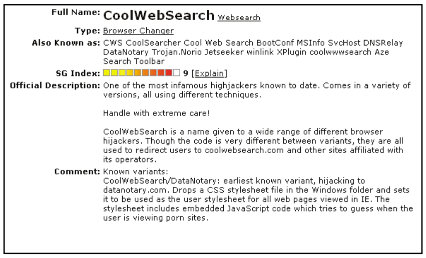
Even amateur spy hunters know that it takes several good spyware scanners to really clean out a sick system, so we burned copies of Microsoft Windows AntiSpyware Beta (free; www.microsoft.com/athome/security/spyware/software/default.mspx), as well as Ad-Aware (free version; www.lavasoftusa.com), and Spybot SD (free; www.safer-networking.org) onto a CD to take on house calls. (*NOTE: Always keep these programs up-to-date.*)

Also include on your CD HijackThis (www.merijn.org) and CWShredder (www.intermute.com/products/cwshredder.html). The former tool explores browser settings where spies can hijack your default start and search pages. The latter is specifically designed to eliminate a family of spyware/Trojans now making the rounds called CoolWebSearch.

But there's more. Because a system badly besieged by spies is also likely to have a virus or worm, too, grab McAfee's standalone virus scanner, Stinger, (free; vil.nai.com/vil/stinger) and the AVG Anti-Virus Free Edition (free.grisoft.com/doc/1).

And finally, detailed spy detection often requires comparing the names of unknown files you find on an infected system against known spyware components. We suggest making a small list of Web site bookmarks, exporting them to an HTML file, and copying this file to the CD. For starters, include these:

Spyware Guide database (www.spywareguide.com/index.php) and eTrust Spyware Information Center (www3.ca.com/securityadvisor/pest) both host an extensive lists of known spies you can compare against .DLL and file names you may find in a system.



Full Name: CoolWebSearch Websearch
Type: Browser Changer
Also Known as: CWS CoolSearcher Cool Web Search BootConf MSInfo SvcHost DNSRelay DataNotary Trojan.Norio Jetseeker winlink XPlugin coolwwwsearch Aze Search Toolbar
SG Index: 🟨🟨🟨🟨🟧🟧🟧🟥🟥☐ 9 [Explain]
Official Description: One of the most infamous highjackers known to date. Comes in a variety of versions, all using different techniques.

Handle with extreme care!

CoolWebSearch is a name given to a wide range of different browser hijackers. Though the code is very different between variants, they are all used to redirect users to coolwebsearch.com and other sites affiliated with its operators.

Comment: Known variants:
CoolWebSearch/DataNotary: earliest known variant, hijacking to datanotary.com. Drops a CSS stylesheet file in the Windows folder and sets it to be used as the user stylesheet for all web pages viewed in IE. The stylesheet includes embedded JavaScript code which tries to guess when the user is viewing porn sites.

Online references, such as SpywareGuide.com, maintain searchable databases of known spyware that you can use to ID culprits on your own machine.

The List Of Corrupt AntiSpyware (www.2-spyware.com/corrupt-anti-spyware) catalogues phony and ineffective "anti-spyware" programs that many neophytes get tricked into installing.

Process Library (www.processlibrary.com) is a searchable database of legitimate DLLs and Windows processes that should be running on a system, a safeguard reference against deleting something valuable to Windows' operation.

WinXP Tip Of The Month

Kill the Messenger. Distinct from the MSN Messenger chat client, the Windows Messenger is a service that runs by default as a way for administrators to send alert messages to users. Most home network users don't need this service and can plug the hole against spammers by opening Administrative Tools in the Control Panel. Double-click Services, scroll down the list, and double-click Messenger. In the Startup Type drop-down menu click Disabled. Also click the Stop button to end the service immediately and then click OK. ▲

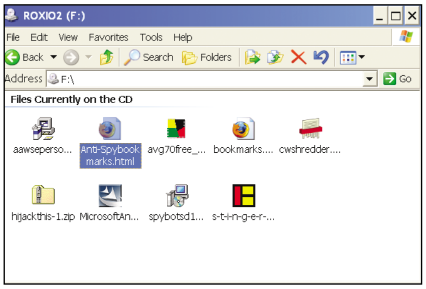
Registry Tweak Of The Month

That pesky AutoRun/AutoPlay. You can try to disable it for different media types in the optical drive's Properties menu (right-click the drive letter), but we found that this doesn't stop all CDs from auto-running. Instead, open Regedit and go to HKEY_LOCAL_MACHINE\SYSTEM\CURRENTCONTROLSET\SERVICES\CDROM. Double-click AutoRun in the right window and change the Value Data from 1 to 0. (This change also prevents Windows from notifying you when a new CD is inserted.) ▲

Safe De-Gunking

The most important point about spyware removal is to do it in Windows Safe Mode. This prevents almost all spyware from loading at startup and makes removal more reliable. At bootup, press F8 after the BIOS screen. Choose the second option, Safe Mode, with networking. You'll need to connect to the Internet to install and update the definitions for the spy checkers.

If Windows doesn't load into Safe Mode, there are two options. First, you can reinstall Windows from its installation CD and let the OS overwrite the previous installation entirely. This was best for us because it saved time; however, Windows XP also overwrites the default file folders such as My Documents, My Pictures, etc., as well as your iTunes, email archives, etc, which could cause problems.



Your spy-killer CD should include not only spy scanners but basic virus scanners and bookmarks to online reference guides that ID spyware components.

Second, you can remove the hard drive from the current PC, change its jumper to slave, and install it on another computer as a secondary drive. You should be able to run the various anti-spyware and virus-scanning software on the infested drive from the host computer. In this case, be careful not to open or copy any programs that are on that slave drive because you have no idea what could work its way into the new host. Just scan the suspect drive on the new host with all of the tools we're about to discuss and then transfer it back to the original PC. Don't forget to change the jumper back to the master setting.

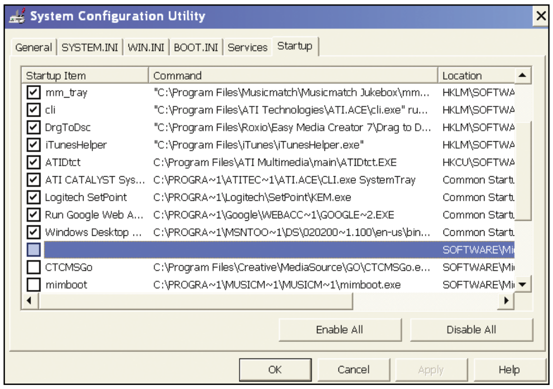
If you're working from Safe Mode, the first step is to hunt down the most egregious culprits. From the CD drive, double-click the Stinger1.exe program and let it scan the system for viruses. Also, open CWShredder.exe and let it detect and fix any CoolWebSearch spies. CWS variants can even load in Safe Mode and are especially hard to root out with anti-spyware programs. If either program finds and fixes anything, then reboot the system back into Safe Mode when they're done.

De-Clutter

Don't underestimate Add Or Remove Programs. Many adware programs actually have an uninstall routine, so first go to Add Or Remove Programs in the Control Panel to identify and uninstall spy/adware suspects. This is when the combination of using Safe Mode with networking and the HTML file of spyware resource bookmarks comes in handy.

Next, root out programs that load with Windows. In Safe Mode click the Start menu, Run, and type **msconfig** in the Open field. In the SCU (System Configuration Utility) window click the Startup tab. Uncheck entries that aren't clearly identified (most legitimate startup programs will identify themselves pretty clearly) such as blank entries or entries with obvious spyware names. Now, these entries you unchecked won't load at startup.

Again, use the browser and the bookmarks file on your CD to navigate to SpywareGuide.com or the eTrust site. If there's a startup item name or command file name in the list you can't identify, put that name into the search box at one of these sites and you may discover that it's a spyware component that you can uncheck. (You might also try Googling the full file name for additional help.) Also, because spyware posing as anti-spyware has become the latest subterfuge, check anything that purports to be an anti-spyware program against the corrupted spyware list we mentioned previously. Remember that you can go back and recheck anything you mistakenly eliminated in the SCU so that it will load when you reboot Windows. Click Apply and OK in the SCU to close the window, but don't reboot yet.


System Configuration Utility
General SYSTEM.INI WIN.INI BOOT.INI Services Startup
Enable All
Disable All
OK
Cancel
Apply
Help

Startup Item	Command	Location
☑ mm_tray	"C:\Program Files\Musicmatch\Musicmatch Jukebox\mm...	HKLM\SOFTWA
☑ cli	"C:\Program Files\ATI Technologies\ATI.ACE\cli.exe" ru...	HKLM\SOFTWA
☑ DrgToDsc	"C:\Program Files\Roxio\Easy Media Creator 7\Drag to D...	HKLM\SOFTWA
☑ iTunesHelper	"C:\Program Files\iTunes\iTunesHelper.exe"	HKLM\SOFTWA
☑ ATIDtct	C:\Program Files\ATI Multimedia\main\ATIDtct.EXE	HKCU\SOFTWA
☑ ATI CATALYST Sys...	C:\PROGRA~1\ATITEC~1\ATI.ACE\CLI.exe SystemTray	Common Startu
☑ Logitech SetPoint	C:\PROGRA~1\Logitech\SetPoint\KEM.exe	Common Startu
☑ Run Google Web A...	C:\PROGRA~1\Google\WEBACC~1\GOOGLE~2.EXE	Common Startu
☑ Windows Desktop ...	C:\PROGRA~1\MSNTOO~1\DS\020200~1.100\en-us\bin...	Common Startu
☐		SOFTWARE\Mi
☐ CTCMSGo	C:\Program Files\Creative\MediaSource\GO\CTCMSGo.e...	SOFTWARE\Mi
☐ mimboot	C:\PROGRA~1\MUSICM~1\MUSICM~1\mimboot.exe	SOFTWARE\Mi

Use the System Configuration Utility in Safe Mode to stop spyware programs from loading in Windows.

The Temp file is where spyware often hides and keeps its installation files, so if WinXP is installed on the C: drive, then it should be located in C:\DOCUMENTS AND SETTINGS\USERNAME\LOCAL SETTINGS. Go there and open the Temp folder and delete everything. If Windows says one of the files is in use, keep that file and delete everything else. In addition, open Internet Explorer and click Tools and Internet Options. Under the General tab, click Delete Files to eliminate browser temp files. If the system's really clogged, click Delete Cookies, even though the user will have to reregister at her favorite sites.

Now, while still in Safe Mode with networking on, install both the Ad-Aware and Spybot programs. Let both programs download the latest profiles. Run both programs in succession in full scan mode to find and delete spyware in Safe Mode. Now reboot into standard Windows mode.

For a badly gunked PC, these steps should get you back into standard Windows mode without a tortuous load time. But we're not done yet. Next month we will hunt down hijackers and browser "helpers" and review the latest tricks for locking down your system against further spy infiltrations. CPU

by Steve Smith

Infinite Loop

Cell Phones Help Beat The Meter Maid

Missing those few extra quarters for the parking meter? No problem. Just dial the number on the back of the meter and you can pay with your cell phone. That's what drivers in Coral Gables, Fla., are doing, anyway. The service is made possible through a Canadian company PayMint; just register your license plate number, and, of course, they want your credit card digits, as well. With this technology, you'll never have to dig under the seats again. ▲

Source: abcnews.go.com/Technology/story?id=851485&page=1

Warm Up To Penguins

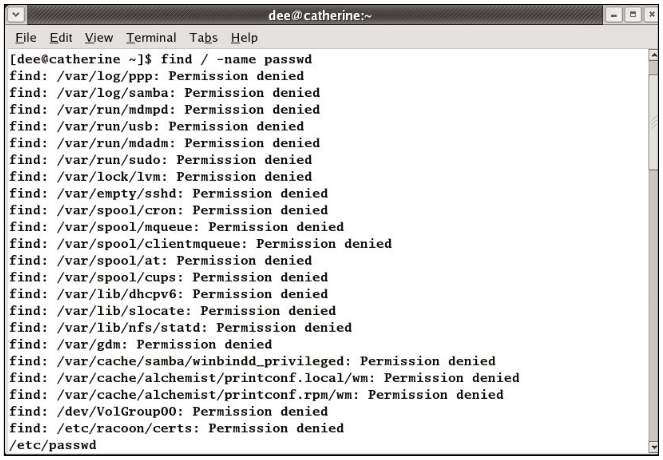
Using The find Command

Certain commands in Linux (and Unix) are vital for those who want to use their systems efficiently. Such commands can be complicated to use, though. One example is the find command, which searches a filesystem for files using a wide range of parameters. The secret to using find at the command prompt involves understanding the most applicable options for what you're looking for and how to put them to work.

Basic find Commands

The most basic use of find is typically used in the form of typing **find** ***directory*** **-name** ***file***. Let's say you type the command **find / -name passwd**. This would start the search in the base directory and search all subdirectories for files named (exactly as) passwd. You can also use wildcards to account for incomplete file names. For example, a search using **passwd*** would look for all files with names beginning with "passwd." Searching for **pass?d** would find files starting with "pass," followed by another letter, and then the letter d.

It is a good idea to put search terms in quotes, such as **find / -name "pass?d"**, to avoid the bash shell (the default Linux command line interface) from doing something funky when it sees characters such as question marks. Another issue can occur when you're searching in directories that you don't have permission to access. If you run one of the commands we have described as a regular user (rather than as root), you'd see a lot of unrelated output returned, such as what appears in Figure 1. You'd also receive warnings for every file and directory that you don't have permission to access, which can be a considerable amount.



```
[dee@catherine ~]$ find / -name passwd
find: /var/log/ppp: Permission denied
find: /var/log/samba: Permission denied
find: /var/run/mdmpd: Permission denied
find: /var/run/usb: Permission denied
find: /var/run/mdadm: Permission denied
find: /var/run/sudo: Permission denied
find: /var/lock/lvm: Permission denied
find: /var/empty/sshd: Permission denied
find: /var/spool/cron: Permission denied
find: /var/spool/mqueue: Permission denied
find: /var/spool/clientmqueue: Permission denied
find: /var/spool/at: Permission denied
find: /var/spool/cups: Permission denied
find: /var/lib/dhcpv6: Permission denied
find: /var/lib/slocate: Permission denied
find: /var/lib/nfs/statd: Permission denied
find: /var/gdm: Permission denied
find: /var/cache/samba/winbindd_privileged: Permission denied
find: /var/cache/alchemist/printconf.local/wm: Permission denied
find: /var/cache/alchemist/printconf.rpm/wm: Permission denied
find: /dev/VolGroup00: Permission denied
find: /etc/racoon/certs: Permission denied
/etc/passwd
```

Figure 1. A regular user running find can often end up with many errors if she doesn't have access to large parts of the filesystem.

You can get around this by redirecting error output to a special channel called standard error, so that you don't see it. You can do this by using the 2> operator and by sending the error output to /dev/null, which is a location that means "throw this away." Thus, typing **find / -name passwd 2> /dev/null** amounts to saying, "Look through the entire filesystem for a file named exactly passwd and toss all related error messages away because I don't want to see them."

Add Power To Searches

Many users never use find beyond these basic levels. The command can help administrators, however, run simple operations on many files simultaneously or search a system for particular types of security concerns. We can't cover all these options here, so we'll focus on a few of the more popular ones. (To peruse these options in more depth, type **man find** at a command prompt.)

One helpful option is -mount. Typing **find / -mount -name passwd**, for example, tells find to start searching in the root partition, which contains your filesystem's base directory, and not to proceed to other partitions. If you know a file you're looking for is in a particular partition, you can use -mount to cut down on how much of the filesystem you disturb, as find does hit your filesystem and CPU resources fairly hard.

There are also numerous methods to run searches that involve time values. Perhaps the most common options involve the last time a file was modified. For example, -mmin lets you search for files changed a certain number of minutes ago. You must specify the numbers properly, however. If you typed **-mmin 5**, for example, find would search for all files modified exactly five minutes ago. Typing **-mmin +5** would look for files changed more than five minutes ago, while **-mmin -5** would look for files changed less than five minutes ago. For example, typing **find / -mmin -5** would instruct find to search the entire filesystem for files changed in the last 4:59 (minutes:seconds).

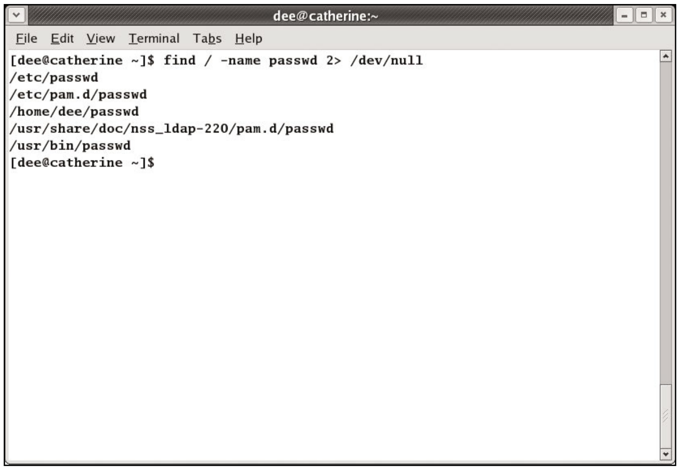
Another time-based option is -mtime. It looks for files that contain data changed a specific number of days ago. For example, typing **-mtime +5** would search for files with data that was changed more than five days ago. This option counts backward in groups of 24 hours, so +5 would look at the current time (say, 5 p.m.) and search for files changed more than five days ago from 5 p.m. backward, not from the start of that day.

Let's say you only want files that have been modified more recently than another specific file. To do this you can use -newer and specify the path to the file you want to compare against. For example, typing **find / -newer /etc/passwd** would look for all files with data changed more recently than the file /etc/passwd.

Other options use identity-related search criteria. Two of the most useful are -nouser and -nogroup. Using one or both lets you search for files orphaned after user accounts have been removed from a system. Essentially, such a search looks for files with numeric UIDs (User IDs) and/or GIDs (Group IDs) without matching account declarations in /etc/passwd. You can also search for a specific username (-user), group name (-group), UID (-uid), or GID (-gid). For example, typing **find / -nouser** will search for all files belonging to UIDs with no name associated with them, while **find / -uid 550** would show all files belonging to the user assigned the UID 550.

A useful find option for security sweeps is -perm. It requires understanding the octal (numeric) form of permissions (such as 644 referring to rw-r—r—) and special permissions. Both topics are beyond the scope of this article, but where this option comes in handy is in searching for SUIDs (Set UID) and SGIDs (Set GID) files, which are necessary at times but dangerous security-wise because they can be used to make scripts and programs run as root, even though the root user isn't running them.

To search for a SUID file, type **-perm -4000**, which looks for all files with the SUID bit set, no matter what other permissions are set along with the set. For SGIDs type **-perm -2000**. An example would be typing **find / -user root -perm -4000**, which lets you find all files that would end up running as SUID root.



```
[dee@catherine ~]$ find / -name passwd 2> /dev/null
/etc/passwd
/etc/pam.d/passwd
/home/dee/passwd
/usr/share/doc/nss_ldap-220/pam.d/passwd
/usr/bin/passwd
[dee@catherine ~]$
```

Redirecting error messages to /dev/null can toss them out in the "bit bucket" so you can just focus on the matching files.

Another option is searching by file size using the –size command. Just as with using the time option, you can use a modifier, plus sign, or minus sign in front of the size to search for a file by an exact size or larger or smaller than a specified size. Rather than make you work through crazy math, you can use letters, such as k for kilobytes (for example, typing **find / -size +4000k** searches for files larger than 4,000KB). You can find more size-related options by typing **man find** at a command prompt.

To run a command on matched files that are returned using certain search criteria, you'd use the -exec option with a special format. For example, to give all the files that find matches a long format file listing (using the command ls -l), you'd type **-exec ls -l {} \;** at the end of the find command. So, to give a long format file listing of all the SUID files on your system belonging to root, you'd type **find / -user root -perm -4000 -exec ls -l {} \;**. The curly brackets are a stand-in for the file you found, so you would put these curly brackets wherever you'd otherwise put the file's name in the command. The \; tells find that you've finished telling it the command to run.

Go Forth & find

The find command can be a Linux user's and administrator's best friend. With it you can do such simple operations as back up or move groups of files without working on one file at a time. You can also track down debris scattered about after old users are removed from the system. Even if you only ever use find because you forgot where you saved a file, it can save you a lot of grief.

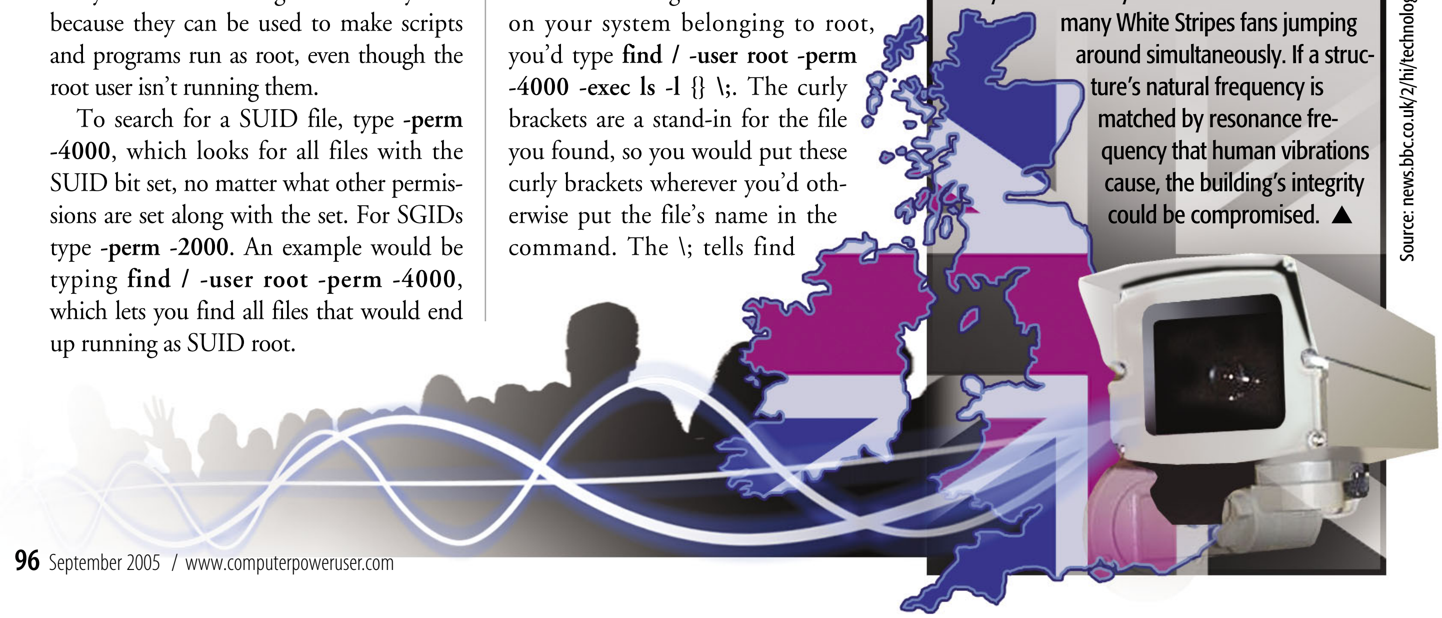
by Dee-Ann LeBlanc

Infinite Loop

Rock The House

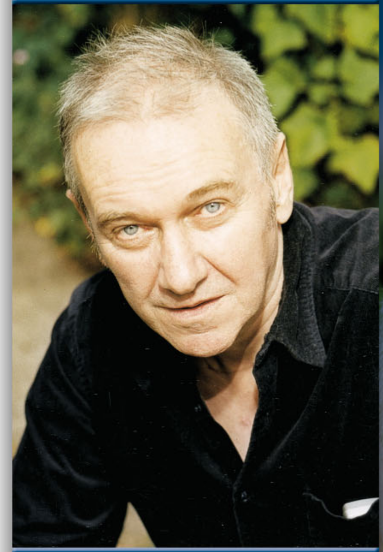
British engineers are remotely monitoring stadiums with accelerometers and CCTV cameras to determine the vibration effects on the structures. Some of the UK's older structures are more prone to the damaging vibration that thousands of people moving in the same manner cause, such as moving to the beat of music. Researchers want to gather behavioral data for various events and see how sports fans move compared to rockers and concert goers. The aim is to make sure the venues are structurally sound so they won't crumble from too many White Stripes fans jumping around simultaneously. If a structure's natural frequency is matched by resonance frequency that human vibrations cause, the building's integrity could be compromised. ▲

Source: news.bbc.co.uk/2/hi/technology/4101128.stm



It's Time To Torment Microsoft

by Mike Magee



Mike Magee is an industry veteran. He cut his teeth on ancient products like the Dragon and the Japanese PC platforms long before the IBM-PC won. He worked for a corporate reseller in the mid-'80s and saw the Compaq 386 sandwich box and every GUI known to humankind. Mike decided that the way to go was the Interweb around 1994 after editing PC mags in the late '80s and '90s. A co-founder of The Register, Mike started the chip-driven INQUIRER (www.theinquirer.net) in 2001. He has contacts from top to bottom in the business, spanning the entire chain, who help him root out interesting rumours and speculation.

You will be delighted to read that I'm not going to write about dual-core chips this month, whether they come from Intel, AMD, or VIA. I spoke with a senior CPU analyst of many years standing and he said to me: "Mike, aren't you completely bored by dual-core processors?"

Frankly, I am. I'm still waiting for super Pentium M-based desktops to appear that Intel showed off at its developer conference in February. Will they come with a great big Apple logo on the side when they arrive next year? I personally don't care whether they have a peach, walnut, apple, or pear on the outside as long as they run fast, quietly, and mean that next time I buy a desk, it doesn't have to be a big one. I don't care if these machines have dual cores, four cores, or four hundred cores. I'd like a lovely, lovely TFT LCD screen too, but I'm not buying one of those until the manufacturers get their finger out and produce screens with high resolution and faster response times—they just don't cut it yet.

Just as long as companies don't need an operating system designed by a committee of 10,000 Microsoft developers, which will eat up even 160GB of hard drive space, clog 2GB of DRAM, and require 15 minutes to boot up. Oh, and another 10 minutes to shut down.

Yeah, I'm talking Microsoft Longhorn, the operating system that's been hyped so much it's like the land that time has forgotten (you know, where dinosaurs roam). I used to be a software coder in the days when there was so little memory in machines that every additional machine code instruction mattered. Just add an extra instruction or two, and your program wouldn't run.

I'm writing this column on a machine with 1GB of memory, an Intel 630 processor, and a hard drive that looks like it will take forever to fill up. It's so big that I used a £25 Icy Box to transfer all the data from my old hard drives and there's still bags of room left. One of those hard drives was a 5MB unit. 5MB! And it had a Windows operating system on it, as well. These Icy Boxes are nice things, mostly because of their simplicity. Essentially, they're enclosures for hard drives and come with different interfaces for Serial ATA, for FireWire, and for USB and support hard drive sizes up to 250GB. The one I've got has an IDE interface; you just open the thing up, plug in the hard drive as a slave, and switch it on. Hey presto, fast transfer of ancient and modern data.

I have a fantasy sometimes where I imagine myself as head of software development at Microsoft—no, I don't want Bill Gates' fortune. I want to instruct every software developer at Microsoft that they have two months to produce a brand-new operating system, and they'll have to use a machine that's got 64K of memory and a 2MB hard drive. They'll have to write the OS in machine code although I will be willing to allow high-level programming languages for drivers, but only on a separate machine.

The code will have to be written really tightly, and the programmers won't be able to import wodges of previous versions of Windows, fragments of DOS code, or any of that other old rubbish from yesteryear. When the OS is finished, it can be installed on a brand-new, top-end machine and will then sing as happily as a bird that's free. When you switch on your Pentium M machine with this fantastic OS, you won't have time to make a cup of tea before it starts; never mind the full English breakfast that you have time to make right now. It will switch off quickly, too.

You know what? I don't think this is a fantasy. I think that Microsoft has such an operating system, but it's just that like an everlasting light bulb, the marketers don't see much money in it. So it's Longhorn then. ::sigh:: ▲

> . . . they'll have to use a machine that's got 64K of memory and a 2MB hard drive.

Send rumours to "Mad Mike" Magee at Mike@cpumag.com.

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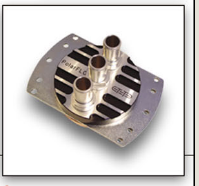

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Mike Hermon
X-TremeModz.Com

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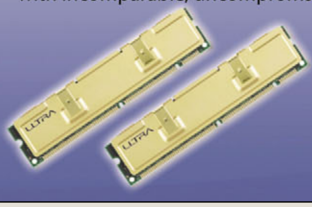

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Fully loaded the Voodoo OMEN will cost you approximately $10,000, coincidently this is about the same amount you could pay for an all-inclusive, deluxe 2 week vacation on a remote tropical island with your entire family. In it's defense, the EDEN is this years winner of the CGM Ultimate Gaming Machine Competition, driven by the blistering speed of Hitachi Hard Drives and the raw core power of an AMD processor. These are comforting thoughts indeed; to be savored while one is basking in the hot sun, far from the hustle and bustle of ordinary life. The EDEN is available in a tempting array of configurations and color combinations making it certain that the perfect machine for you is just waiting to be discovered. We look forward to seeing you soon at our website, where you can discreetly design your own dream machine, er...rather, dream vacation, at any time of day or night. ...**however, the way you explain this vacation to your family is entirely up to you.**

Guest Column

by Matthew Witheiler

The HD Disc Revolution

The word "revolution" is perhaps the single most overused word in the electronics industry. Almost any time there is the slightest change in technology, marketers are quick to proclaim the advancement a "revolution." We've had the MiniDisc revolution, the virtually reality revolution, and who could forget the oft-promised speech-recognition revolution? So what am I doing here writing a column on the high-definition disc revolution? I'm talking about an upcoming technology that will fundamentally change the way you watch movies, is what.

The *Merriam-Webster* dictionary defines revolution as "a fundamental change in the way of thinking about or visualizing something." Of all the technologies on the horizon that have the potential to fundamentally change the way we visualize, high-definition discs have the greatest potential. Offering video that contains the fidelity of a 2MP digital camera and next-generation audio, more like that found in the cinema, content on the next-generation media will be more movie-like than ever before and do to the DVD what DVD did to the videotape: make it a relic.

Not unlike the VHS-Betamax battle waged in the late 1970s, there are two different optical high-definition technology standards vying for a place in your home. One standard, called HD-DVD, is primarily backed by Toshiba and NEC and offers 30GB of storage potential. The other competing standard, Blu-ray, is backed by the likes of Sony, Dell, and HP and stores up to 50GB, although the technology is more expensive to implement than that of HD-DVD.

Despite the fact that HD-DVD and Blu-ray are fighting a battle royal over your home, both are ultimately very similar. Both are based on blue-laser technology, both use media that is similar in size and shape to DVDs, and both are based on an exciting new video compression technology called **H.264**. This last point is possibly the most revolutionary aspect of high-definition discs in terms of technology.

H.264 is the key technology that gives the next-generation optical discs their significant edge over DVDs. H.264 replaces the MPEG-2 digital video standard used in DVDs and is an extension of the MPEG-4 standard. Be it a Blu-ray or HD-DVD, the next-generation media will store video at high-definition resolutions (1,920 x 1,080, perfect for all the HDTVs that have flooded the marketplace) with less artifacts (like macroblocking, typically seen in MPEG-2 videos) all in a single disc, thanks to H.264. All of this increased capability offered by H.264 videos on Blu-ray/HD-DVD discs comes at a cost, however.

Translating the digital bits in an H.264 file into video that you can see on your television or computer display is very computationally complex. Unlike the mature MPEG-2 video standard used by DVDs, H.264 video is a relatively new technology that requires much more power to play. Even on today's highest-end CPUs, playing back these computationally complex video files would require more than 100% of the system's resources for smooth playback. That means that if you expect your current rig to play back high-definition discs, you best think again; that is, unless something can offload some of the tasks and help share the burden with the CPU. Enter the visual processing unit.

The visual processor has great potential to help share the task with the CPU. For instance, ATI's hardware-assisted H.264 decoding, found in the Radeon series graphics cards, can significantly lower the system requirements for high-definition disc playback. In the example above, where more than 100% of the CPU is needed to play back smooth H.264 video, the hardware acceleration offered by the Radeon products is able to leave the CPU with only a 20 or 30% load. That means that not only will your computer be able to play back H.264 content without significant upgrades, it will be ready to rock and roll once Blu-ray or HD-DVD discs make it to market (something that is expected to come in winter of 2005 or early 2006).

And now for the ultimate test: Are Blu-ray and HD-DVD going to present "a fundamental change in the way of thinking about or visualizing something?" Can we call the transition to high-definition discs a revolution? By offering true high-definition video pictures, significantly less video artifacts than before, and enormous storage potential, I think so, but not without the help of a hunk of graphic processing silicon. ▲

Send comments to MattW@cpumag.com.

Matthew Witheiler has always had an interest in the crazy, mixed-up world of hi-tech. A child of the 80s, he once took apart his parents' TV to try and find Alf (a quest still underway). Matthew's career took a turn when he joined the idolized world of computer journalists—all in the quest to discover what makes things tick. As a Senior Product Manager at ATI Technologies, armed with his Duke University degree and a passion for keeping people entertained, Matthew has vowed to ensure that every living creature in every place on the planet can watch TV. Now if there was only something good to watch.

> H.264 is the key technology that gives the next-generation optical discs their significant edge over DVDs.

Technically Speaking

An Interview With Doug Dodson, President & Founder Of PC Power & Cooling

Of all the components that are in a PC, power supplies have probably been the most ignored. But from Extreme Edition CPUs to SLI graphics, the power requirements of enthusiast systems in particular have recently skyrocketed. We cornered Doug Dodson, the president and founder of PC Power & Cooling, the only American power supply manufacturer and arguably the finest maker in the world, to explain some of the inside tricks of his trade and what PSU buyers should really know before buying.

by William Van Winkle

CPU: Of all things, how did you get into PC power supplies?

Dodson: I was an electronic hobbyist since I was a kid, and my background was in economics and commodity trading. I had one of the first XT computers. The computer was extremely noisy, so I created a special large-diameter cooling fan to take the place of the small fan that was inside of it and just did it for myself to reduce noise. Then people came and saw it. They wanted one, and one thing led to another. I started making these things in my garage in 1985. Then I realized that the entire power supply needed to be redesigned because it was just poorly designed by IBM in the early days. The fan would cavitate. There was no real airflow coming out, so you had a ton of noise and no cooling. We started developing power supplies that were both quieter and cooler than the stock XT power supplies and we started getting customers for both attributes.

CPU: One of your apparent pet peeves has to do with PSU temperature ratings. Why exactly?

Dodson: People don't understand that the actual temperature that the power supply and its components see is far higher than room temperature. When a power supply is rated for 25 degrees Celsius, like most of our competitors, especially the ones that are designed for home use, that's a totally fabricated number put together in order to exaggerate the wattage claim.

CPU: Why fabricated?

Dodson: There is no way in the world that the air going to the power supply is going to be 25 degrees C in the real world because with a 15-degree buildup inside the machine first, before the air reaches the power supply, that means that the room temperature would have to be 10 degrees C. Now you're talking about it being in the 50s Fahrenheit. What these guys selling power supplies rated for 25 C are saying is that as long as you use the power supply in a room that's 50 degrees Fahrenheit, you're OK. But if you were to actually go through the de-rating that they keep very secret and re-rate those power supplies that are rated at 25 C at a more realistic 40, you'd have to cut the wattage rating by at least 33%, compared to what they're advertising. You have a 400W power supply, but the fine print is, yeah, at 25 degrees C. At 40 degrees C it's a 300W power supply.

CPU: So if we buy a 500W PSU with accurate thermal considerations, we're good to go?

Dodson: Actually, it really isn't the wattage of the power supply that counts today because if it's all on the wrong rails, it doesn't do you any good. The only rail that matters whatsoever in today's systems is the 12V rail. That's because the video cards, CPUs, and drives are all being run from it. If the power supply design isn't recent and doesn't take this fact into account, it doesn't matter if you have a 500W power supply, if it only has 20A of +12V power. You'll see 600W power supplies that are down at 24A, whereas our 510W puts out a continuous 34A. That's 50% more power than a power supply that, by wattage, is rated higher than we are.

CPU: Should people focus on peak or continuous power ratings?

Dodson: You want to zero in on the peak rating of the 12V output and how long that rating is for. If you get a 15-second rating on that and you have plenty of amps, then you know that even if you have eight to 10 hard drives, you're going to have no trouble bringing them up simultaneously, with no need for sequencing or a second power supply. But a one-second peak isn't going to get you anywhere. If it puts out the power for one second, that's not enough time for the drives to get going.

> Probably the biggest myth of all is that when a person buys a power supply that's higher wattage is that it uses more juice from the wall and will cost them more in electricity.

CPU: But drives have very little draw.

Dodson: Drives on startup have 300% more draw than they do after they have stabilized.

CPU: Modular power supplies seem to be gaining a lot of traction in the market, but PCP&C doesn't make any modular designs. Why?

Dodson: Yeah, it's real popular, but the industry hasn't done anything to educate people about modular plugs. The pins that are used in the modular plugs have a very low capacity to pass current. You're losing power through those pins. It's electrical resistance between the male and the female part of the pin, to the extent that the voltage drop in just the pins is equivalent to about two feet of wire. The effect is that modular power supplies, everything else being equal, are capable of about 10% less power than power supplies without modular plugs. And that's under ideal conditions. In real life it gets worse because the pins loosen, corrode, and burn. Over time, the resistance builds up. A year down the road, a guy could be running his system and all of a sudden it stops working reliably, and he has no way of knowing that the reason is because the pin inside that modular plug has become corroded or burned.

CPU: Is there such a thing as overbuying a power supply that you plan to keep and migrate through multiple configurations?

Dodson: No, and I'll tell you why. Probably the biggest myth of all is that when a person buys a power supply that's higher wattage is that it uses more juice from the wall and will cost them more in electricity. In fact, our 850 actually costs $65 less a year in electricity to run than a 500W power supply, assuming 10 cents per kilowatt hour. So in a five-year period, you'd save $330, which would be more than the difference in price between our 850 and just an ordinary 500W power supply. This is because our new 850W is 85% efficient, instead of the typical 70 or 72%. To run a particular computer, you're pulling less power from the wall because more power is being converted into DC power, instead of being converted into heat. That's your efficiency factor. So the more efficient the power supply, the less money it costs to run a system.

CPU: How would you like to see PC power supplies evolve in the coming years?

Dodson: One of the things that has bothered us about power supplies is this almost insane lack of standardization on connectors. They've done the modular plugs to try to get around that, but years ago there was one standard, and I think that the entire industry would be helped if we get back to more standardization on the output harness. There are too many permutations, and to no advantage. Once you have a 24-pin connector and an 8-pin connector and this SLI connector, my position is, 'OK, enough's enough, boys. You can make this work.'

As far as form factor is concerned, right now we have an 850W power supply. That one's going to be up to a one kilowatt soon. At that point it will probably be good for a number of years. We're just making some minor modifications. But what I'd like to see is that this new form factor, which is basically an extended ATX, be used in a whole host of server and workstation applications, because it is a form factor that is quite efficient, in the sense that it doesn't require all new cases. You can use your old ATX case; it just needs to be 20 inches deep. And yet you can have twice the power that you have today. With that much power, you should be able to handle just about anything on the horizon from a graphics or server standpoint, from a server standpoint, from anything we can foresee. But there's no mistake about it: We know from video companies that they're going to need that kind of power.

Subscribers can read bonus content with Doug Dodson at
www.cpumag.com/cpusep05/dodson

Under Development

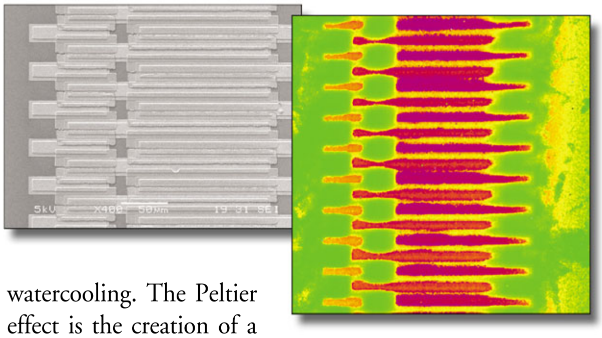
by William Van Winkle

A Peek At What's Brewing In The Laboratory

The Skinny On Cooling

After years of reveling in the beauty and cooling power of finely sculpted heatsinks from Zalman, Thermaltake, and others, the time for a radical change may be nearly upon us. Texas-based nanoCoolers has gained the most fame so far for its liquid metal-cooling technology, which is set to debut in fall 2005 on Sapphire's highest-end ATI-based Blizzard graphics cards. But in the end, liquid metal, which is drastically more thermally efficient than a watercooler, may remain a niche technology for high-budget enthusiasts. The rest of us will likely have to make do with Peltier cooling.

Peltier? Yes, the same technology that some overclockers use as an alternative to using watercooling. The Peltier effect is the creation of a heat difference cause by an electric voltage. When current is run through n-type and p-type semiconductors connected together at two junctions, one junction heats up while the other cools. The trouble with traditional Peltier coolers is that they involve a considerable amount of soldering work placing thermoelectric elements on metal circuits, which in turn mount on a ceramic substrate. The end result is costly, bulky, and prone to high defect rates. A breakthrough from nanoCoolers now provides Peltier cooling in a thin-film form factor that's 30X smaller than conventional Peltier cooling. This allows for 70W per square centimeter cooling in an inexpensive device half the size of a modern CPU die.

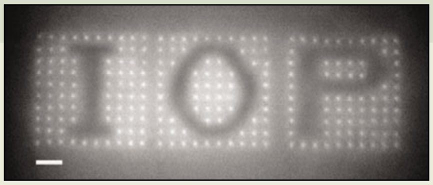


"Liquid metal is a great technology, but it is passive cooling," says Uttam Ghoshal, nanoCoolers CTO. "In other words, it simply moves the heat from the CPU or anything that we cool with it to an ambient exchanger, and it's exhausted by an airflow. Thin-film microelectronics allow us to do active cooling, where we can actively reduce the temperature of the die and perhaps even do it in spots on the die. As such, you have a lot more design flexibility in the ambient exchanger and what you can do on the backside, whether it be heatpipes, liquid metal, or whatever. Ultimately, since everything in electronics comes down to die size, if coolers are smaller and more dense, they are more economical, and we are making them far more efficient than they are today."

nanoCoolers' thin-film thermoelectric design uses metal lithography, so reliability is increased because there is no soldering. Similarly, as fabrication tools allow the thermoelectric components to be made smaller, efficiency rises because thermoelectric size and cooling density are inversely proportional. Thus, the finer the manufacturing process, the more heat a given square of nanoCoolers thin-film can handle. With standard heatsinks one is limited to the efficiency of copper in the base plate and the size and efficiency of the fin, fan, and heatpipe design. When the thin-film thermoelectrics arrive this fall, they'll be the industry's only thin-film solid-state thermoelectric coolers and are expected to sport the highest heat density capabilities available.

"As we go through a couple iterations on this product line," says Ghoshal, "we'll get to a point where electronic efficiency is equal to that of mechanical vapor, such as Freon-based refrigeration. At that point the entire world of cooling is open—everything from air conditioning to refrigeration to watercoolers to ice makers. . . ." ▲

Nail Byting



Lasers can zap tumors, correct vision problems, minimize scar tissue, and a host of other bodily improvements. Now they can also write computer data into your fingernails.

Yoshio Hayasaki and his colleagues at Tokushima University have devised and demonstrated a method whereby human fingernails are irradiated with femtosecond laser pulses. A bit of data registers as a dot, measuring 3.1 microns across. The first experiments were done with an 800nm laser on a piece of nail measuring 2 x 2 x 0.3 cubic millimeters. Bits were focused to depths of 40, 60, and 80 microns. To read the data, the nail is viewed under a fluorescence microscope. The entire nail fluoresces, but the irradiated data points glow brighter.

Hayasaki notes that the same fluorescence signal can read 172 days after initial writing. Don't place too much faith in data permanence, though, as human fingernails tend to be completly replaced after about six months. (Tip: Write your most important data last.) Hayasaki estimates than an average fingernail can hold roughly 625KB of data using present read/write methods. This obviously won't store your next movie download, but it would be enough to stash some key personal identification data to use as a biometric verifier. The Japanese group is now working on methods to record data to live fingernails and compensate for finger movement during writing.

Fans of French manicures may run into read/write problems or at least run into a philosophical dilemma between fashion and data retention. Then again, a dual-layer process might solve the problem. Or perhaps the patterns in which data are written might become a new fashion statement. ▲

Bovines Get Moootooth

Happy cows may come from California, but high-tech cows graze in Denmark. The Danish company Blip Systems, working with numerous Danish cattle and agricultural organizations, set out to use Bluetooth sensors that are planted on cows in larger herds to gather data on them and track their activities. (This seems only appropriate, given that Bluetooth is named for Viking king Harald Bluetooth, the 10th century unifier of Denmark.)

The problem is that diseases are hard to spot in large herds, leading to increased labor, higher care costs, and premature death. Because multiple access points can triangulate Bluetooth radio transceiver position, location data for each bovine can be monitored. This data is then combined with pulse and body temperature readings, as well as how often the animal stands or lies down. All this information is then beamed back to the host for analysis.

"If the cow changes its behavior, it is possible to predict which diseases might be in question," says Peter Knudsen, Blip Systems CEO, in a press release.

If the experiment ultimately proves successful, Blip Systems expects a commercial version of the Bluetooth monitor system will cost about $115 per cow. From use on farm animals, it is really only a small leap to imagine how the same technology might also be applied in caring for elderly humans. For example, A decline in activity or vital statistics of an individual that a computer is monitoring 24/7 could greatly aid in catching problem signs, especially in residents of large care facilities. ▲

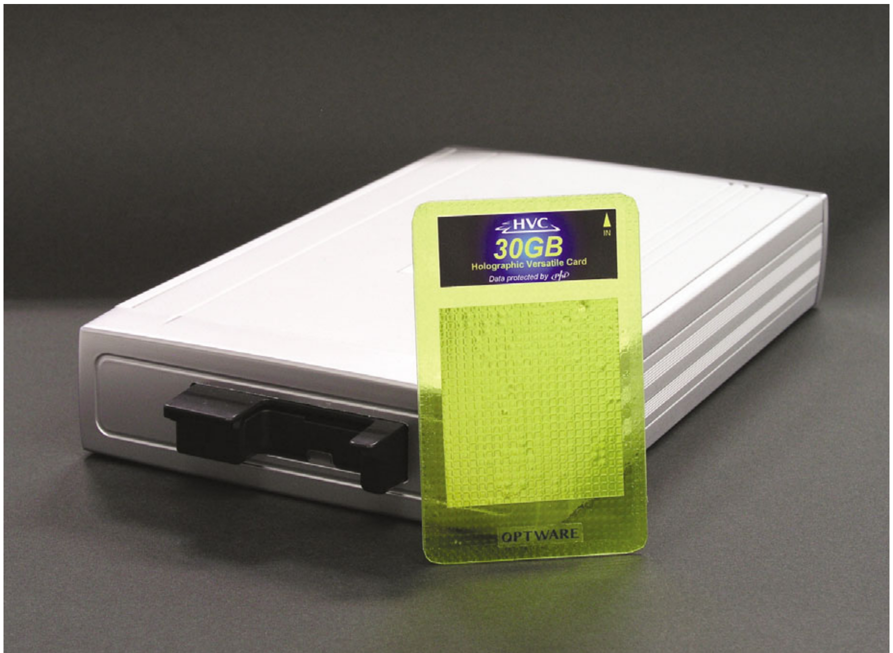
Is That A Movie In Your Wallet?

Back in July 2002's issue (page 107), we reported that the Japanese company Optware was aiming to have a 120mm 1TB optical disc (the HDV, or Holographic Versatile Disc) and a compatible player by the end of that year. We are still waiting on the disc, but to hold us over, Optware has a new project based on the same "collinear holography" research, which has been dubbed the HVC (Holographic Versatile Card).

More humble but much cooler than the possibly stillborn HVD, the HVC only holds 30GB of data, yet fits its patch of holographically encoded data onto a patch of plastic set within a card the size of a Visa. Optware expects the technology to perform read/write ops at three times the speed of Blu-ray, one of the two leading contenders for tomorrow's HD video disc standard. There's no indication yet that HVC media would be any more resistant to data errors from dirt and scratching than traditional 120mm discs.

The good news is that Optware anticipates that the 30GB card would sell for less than $1 each. The bad news is that the card readers, if and when they ever reach market, will push close to $2,000. That said, it wasn't that long ago that the first rewriteable DVD drives, which arrived as consumer electronics components first, exceeded $1,000, and you can now find one on eBay for less than $50.

Optware provided us with the photo seen here, but the company says it doesn't have additional information on HVC to add at this time. Provided that Optware doesn't sell HVC to Sony, this might be one video media technology that manages to avoid a format war. ▲



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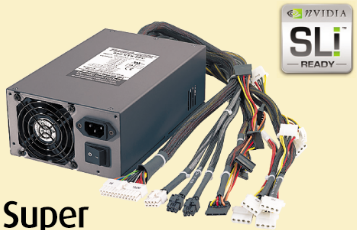

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Q&A With Art Coviello, Jr.

Unless you exist in the digital world without security, you’re probably using protection measures built on top of technologies made by RSA Security. Secure browser sessions via SSL? That’s RSA. WEP and WPA for secure wireless networking? RSA. The list goes on, and the man in charge of keeping the digital age secure for the past 10 years is RSA Security’s CEO, Art Coviello, Jr. In a real sense, he holds the key to protecting your future assets and identity, and he shares with *CPU* some insights on how that’s going to happen.

Q **RSA’s SecurID token is supposed to replace the Windows logon password, among other things. How does that work?**

AC We combine a PIN, something that you know, with a token that generates a unique passcode that changes every 60 seconds. This is much more efficient and easy to use than some type of a challenge-response type of device, where you have to go back and forth a couple of times. With us, you remember the PIN like your ATM card, you read a six or eight digit code off of the digital display on the token, type that in, and the combination of the two becomes your passcode for that minute and that minute only. It’s much better than a password, stronger, and, quite frankly, easier because you don’t have to remember it.

Q **Your technology is inside the Sony PSP, as well as smartphones and other mobile devices. How will secure mobility evolve in the future?**

AC We have a mantra: credentials everywhere and everywhere credentials. Why can’t your MP3 player be an authentication device? Why can’t any of these devices that you carry all the time be some type of an authentication device? Korea has a CDMA mobile phone; customers use SecurID to secure ecommerce transactions when they use their phones. They use it to generate onetime passcodes, basically the SecurID code. By having this service, the Korean telecom company expects to help its consumers protect their online assets and be the first telecom company in Asia to offer this protection. It’s amazing how, outside the U.S., there is a lot of experimentation going on, and it will find its way back here.

Q **Is the current problem with identity theft primarily caused by not properly implementing existing security solutions?**

AC Largely, yes. There are about 300 million people that log on inside a firewall every day, and less than 1% use strong authentication. Outside the firewall, just accessing Web-based applications, you have 600 million consumers and partners and vendors accessing portals every day. 600 million. And the vast majority of those are using static passwords that can be captured with keystroke logging or some kind of phishing attack.

I said for years that people shouldn’t be afraid to send their credit card information over the Internet because chances are it’s protected by SSL. What they ought to be afraid of is where that credit card information or personal information is being stored and how well protected it is because a criminal is not going to try to break into one SSL session to get one credit card. A criminal is going to go after the database itself.

Q **Describe how you see digital security involved in everyday life a decade from now.**

AC You will have probably four or five digital identity devices: one for use with the government, one might be part of your driver’s license, one used in conjunction with your credit card, one credential that helps you do online activities that aren’t necessarily associated with anyone, and you’ll obviously have a work credential. These may be in the form of a biometric, a credit card, a PDA, or some other electronic device. They will probably have some RF capability built into them, so you don’t even have to enter information. Then you just get close enough to a computer and maybe touch a biometric scanning device or type in a PIN as a second factor, and it reads your identity information. That identity information is all very well encrypted, and not only does it sign you on to your computer and your favorite Web site, but it also enables you to sign transactions digitally and give you the same kind of legal authority as if you were writing a check. It’ll be easy, safe, and you’ll use it all the time.

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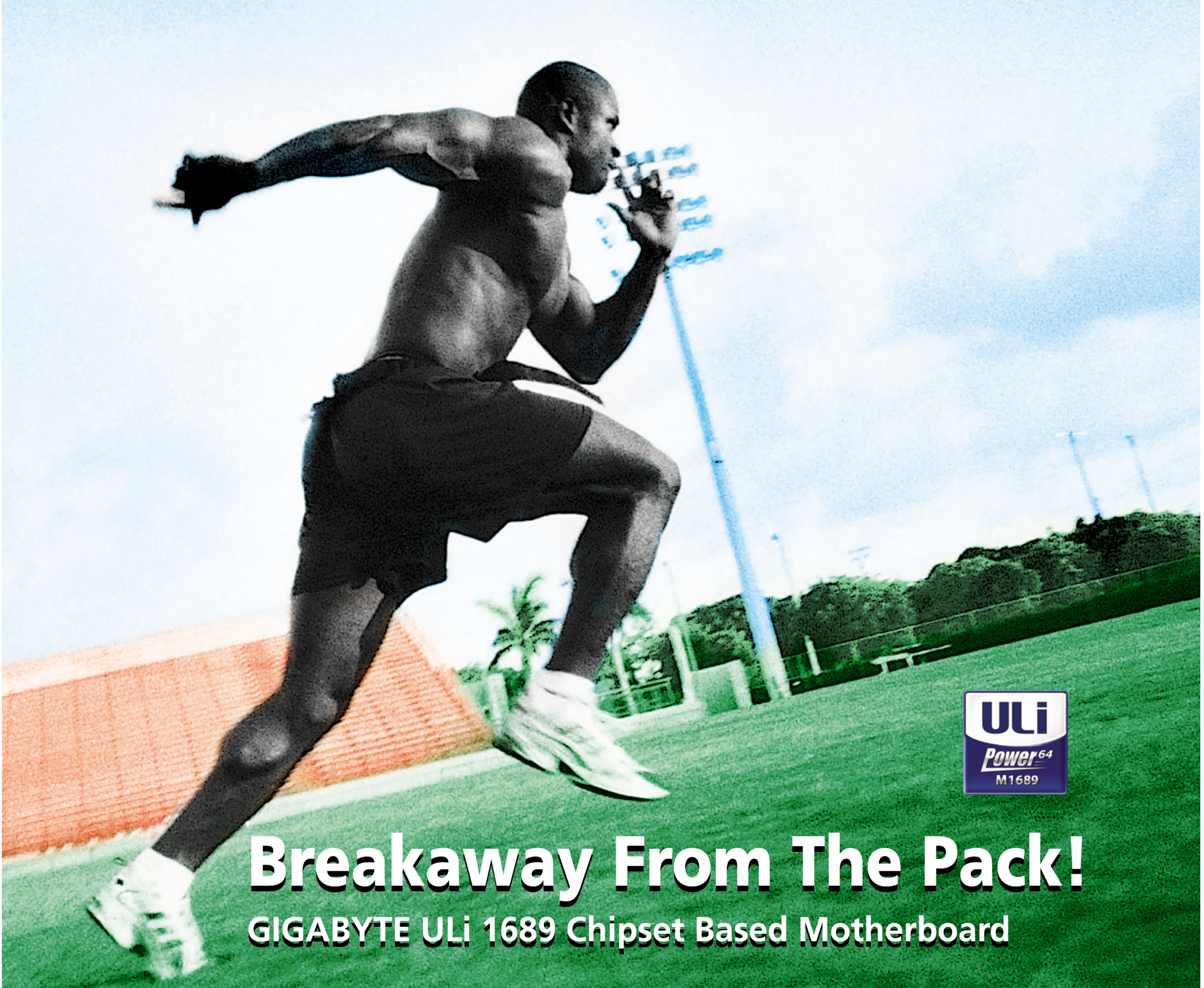
William Van Winkle began writing for computer magazines in 1996. He was first published in 1990, the same year he took his first job in computers. He and his family live outside Portland, Ore.



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